

TRACKING PROGRESS TOWARDS SUSTAINABLE REGIONAL DEVELOPMENT: REVIEW OF A FEW METHODOLOGICAL FRAMEWORKS

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Abstract: This article aims to discuss methodological frameworks for measuring the progress and performance of regional development in moving towards sustainability. The review discussion was drawn from the concept of sustainable development and commonly used sustainability frameworks such as Pressure-State-Response, Driving force-State-Response, Driving force-Pressure-State-Impact-Response and Social-Economy-Environment theme frameworks including its associated issues and challenges. Majority of these frameworks include a set of indicators and core indicators while there is no standard or commonly accepted method for selection of indicators though some studies provide some criteria or guidelines. Thus, the comparison of sustainability assessment from different methodological frameworks cannot be done directly, making it difficult to select the best possible set of indicators that meets the goals of sustainability assessment at various levels. This is of concern, particularly for decision-makers who may want to develop or adopt a methodological framework of performance indicators for tracking the progress of sustainable regional development. Therefore, this article suggests that the methodological frameworks for assessing sustainable regional development should include multiple sectors and stakeholders, dimensions of sustainability and scales which meant to be generic and flexible, so that it can be applied across a range of issues, regions and local areas.

Keywords: Sustainable development, sustainable regional development, sustainability assessment frameworks.

Introduction

According to The Brundtland Report in 1987, sustainable development (SD) defines as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). The idea that not only to mind of our own welfare but also that of future generations has emphasized from influential reports such as Club of Rome (Meadows *et al.*, 1972) and The Brundtland report. The concept of sustainability also charges with complexities as it involves balancing of three different goals of development such as economic utility, social equity and ecological or environmental integrity. Figure 1 shows how three dimensions (economic, environmental and social) of SD involves complex synergies and trade-offs among each other. The concept of sustainability, their definitions and interconnections are crucial

for better understanding and communication in the process of moving our nation, region or society towards sustainable development. This article aims to discuss methodological frameworks for measuring the progress and performance of the regional development in moving towards sustainability. The article is based on a literature review of the sustainable development concept and sustainability frameworks such as Pressure-State-Response, Driving force-State-Response, Driving force-Pressure-State-Impact-Response, and Social-Economy-Environment theme frameworks. The following sections deliberate the concept of sustainable regional development (SRD) in the context of Malaysia and some commonly used sustainability frameworks including its associated issues and challenges tailed by the discussion and conclusion.

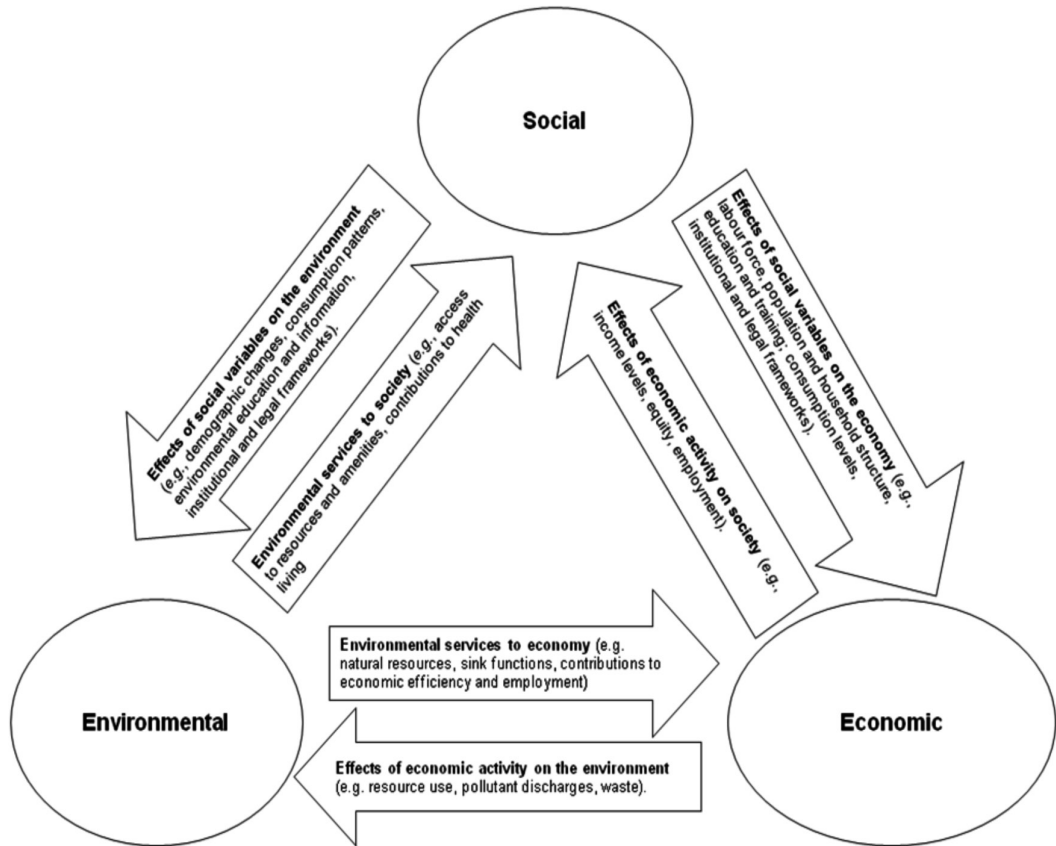


Figure 1: Interconnections of key dimensions of SD (OECD, 2005)

Sustainable Regional Development

Regional development is a broad term which might be in domestic or international. Therefore, the scope of regional development may vary based on how a region is defined and its boundaries are perceived internally and externally. Generally, regional development can be seen as an effort to reduce regional disparities by supporting economic activities in regions by means of employment and wealth generation, large-scale infrastructure development, attracting investment and allocation of significant public funding. Malaysia has introduced the Corridor and City Transformation Programmes to strengthen the economy and to enhance the quality of life in five regional economic corridors and cities, namely:

- Northern Corridor Economic Region (NCER) and Georgetown,
- Iskandar Malaysia and Johor Bahru,
- East Coast Economic Region (ECER) and Kuantan,
- Sarawak Corridor of Renewable Energy (SCORE) and Kuching, and
- Sabah Development Corridor (SDC) and Kota Kinabalu.

The Corridor and City Transformation Programmes aim to propel the national transformation agenda in building a high-income society by the year 2020. By adopting a cohesive approach to the progressive regional development, the aim to achieve high-income nation will not only be achievable and

sustainable but will also be inclusive, enabling all Malaysians in all regions to enjoy a high quality of life. The Regional Corridors and cities will complement the development of Greater Kuala Lumpur/Klang Valley which is one of the twelve (12) National Key Economic Areas (NKEA) under the Economic Transformation Programme (ETP). Ngah (2010) also urges that the appropriate strategies for future regional development in Malaysia should focus on capacity building, improve productivity and quality of life of the rural regions, improving linkages between core and periphery regions, as well as maintaining environmental conservation of natural resources in the rural areas.

Sustainable development must be defined and applied according to a specific spatial context such as global, national, regional or local level. The methodological frameworks or measurements are crucial to evaluate the sustainability of regional development. Thus, sustainable regional development (SRD) should be an integrated framework to manage regional and local development in a sustainable way. The measurement of SRD, however, is more difficult, and should reflect the goals and principles of SD into the regional development. This measurement could highlight the

diversity of regions as well as the disparities of regional conditions and outcomes across the environmental quality, economic vitality, and social equity. Dialogue, knowledge sharing, coordination, better indicators, focused action, and targeted resources are critical elements to successfully move the region towards sustainability.

Methodology

Based on the SD concept, several frameworks have been developed by the international organisations such as United Nations, World Health Organization (WHO) and the Organisation of Economic Cooperation Development (OECD). These frameworks play a crucial role as a foundation of constituting sustainable development strategies and its evaluation. This section provides a brief overview of commonly used sustainability frameworks which might be useful for tracking progress towards sustainable regional development.

Pressure-State-Response (PSR) Framework

The Pressure–State–Response (PSR) framework is primarily based on the concept of cause and effect phenomena. This is widely

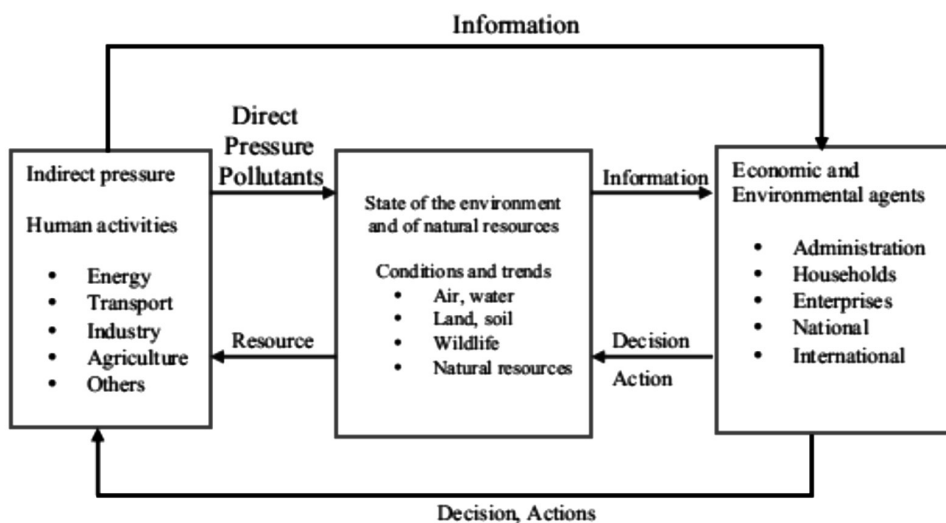


Figure 2: Pressure-state-response framework (OECD, 1998)

used indicator framework developed by the OECD, Canadian government and UNEP (Hammond *et al.*, 1995). This framework classifies indicators in pressure, state and response, for example, the impact of human and economic activities which exert pressures on the environment lead to changes in the state of the environment i.e. change in the quality and quantity of environmental conditions. Consequently, society responds to change the pressures and state of the environment through environmental, economic and sectoral policies (called ‘societal response’) for its adaptation (OECD, 1993). Response of society acts as a feedback to pressure segment through human activities as shown in Figure 2.

Driving force-State-Response (DSR) Framework

The Driving force–State–Response (DSR) framework is also an indicator framework used by the OECD for environmental indicators in agriculture (OECD, 1999, 2001a) where the concept of ‘pressure’ is replaced with the concept of ‘driving forces’. The concept of driving forces recognizes that agricultural activities have both positive (beneficial) and negative (harmful) impacts on the environment. For example, in one hand, by increasing the water storage capacity of certain agricultural systems which may ameliorate problems of soil erosion, landslides and flooding that contributes

to enhance environmental quality. On the other hand, the excessive used of fertilizers and pesticides as well as inappropriate management practices have impacts to the environmental degradation. This concept also addresses a wide range of influences affecting to the environment in agriculture and sustainable agriculture, including farmers’ behavior; economic, social, and cultural factors; and government programs and policies.

Driving force-Pressure-State-Impact-Response (DPSIR) Framework

The Driving force–Pressure–State–Impact–Response (DPSIR) framework is basically an extension of the PSR and DSR frameworks which is adopted by the European Environmental Agency (EEA) and the European Statistical Office in 1997. According to the DPSIR framework, social and economic developments are driving forces that exert pressure on the environment and leads to changes in the state of environment. In turn, these changes lead to impacts on human health, ecosystems and materials which may elicit a societal response that feeds back on the driving forces, pressures, or on the state or impacts directly (Smeets & Weterings, 1999). Figure 3 shows five classifications or aspects of indicators and their connections.

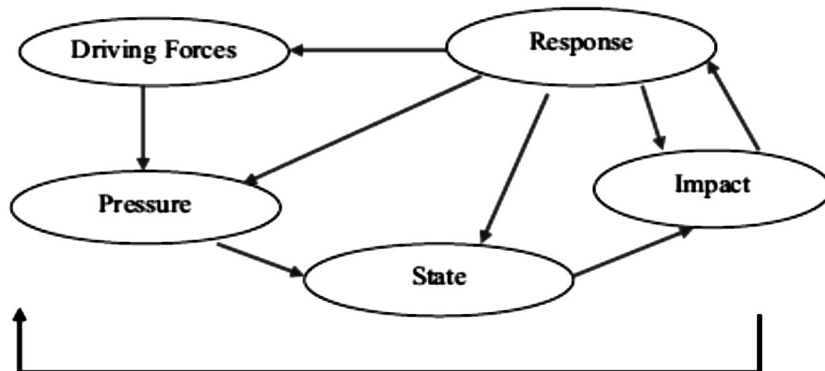


Figure 3: Driving force-Pressure-State-Impact-Response framework on environmental issues (Smeets and Weterings 1999)

Social-Economy-Environment Theme Framework

The Social-Economy-Environment theme framework reflects the importance of three pillars of sustainable development. Chang *et al.* (2009) emphasizes to evaluate the sustainability of regional development through judging if the three subsystems run and develop harmoniously. This framework includes three class indicators to evaluate the sustainability of regional development. For example, social indicators consist of some indicators that describe the development of social subsystem while economic indicators consist of those indicators described the development of economy subsystem, whereas environmental indicators consist of some indicators that describe the development of environmental subsystem.

California Department of Transportation and California Strategic Growth Council (2010) presented a regional sustainability framework consists of three E's of Environmental quality, Economic vitality, and social Equity which basically represent the Social-Economy-Environment theme framework of SD. This

framework articulates and measures what sustainability means for California and the progress of the regions in moving towards sustainability. It presents twenty integrated, place-based quality-of-life indicators which are organized into four interrelated groupings, with the three E's interwoven across all groupings through the indicators' linkages, context, and contributing factors. The four groupings which represent the range of indicators are efficient transportation and land use; economic competitiveness and opportunity; environmental health; and resource efficiency and conservation as shown in Figure 4. The indicators reflect the mission and objectives of the Strategic Growth Council to support the planning and development of sustainable communities throughout the state, to steward the natural resources, and to promote the health and well-being of all Californians. For the case of California, based on social-economy-environment theme indicator framework, the growth curve is taken to describe the development of each theme, and then the comprehensive development index model is constituted to evaluate the sustainability of regional development.



Figure 4: Regional sustainability framework for California

Discussion and Conclusion

Environmental or sustainability assessments have become an important tool in planning and evaluation at all scales of decision-making which are usually based on the use of environmental indicators (EEA, 2001; EPA, 2003; Esty *et al.*, 2005; McRae *et al.*, 2000; OECD, 2001b; UNEP, 2002; Wascher, 2000; WRI, 2005). However, Bakkes *et al.* (1994) recognize three types of indicator classifications: (i) by use (e.g., early warning, general policy), (ii) by subject or issue (e.g., air quality, acidification) and (iii) by position in causal chains. Majority of the sustainability assessments rely explicitly or implicitly on any of the common causal chain frameworks such as PSR, DSR and DPSIR which help to organize and structure indicators in the context of a causal chain that links indicators of the environmental driving forces to pressure indicators; to environmental state indicators; to impact indicators and finally to indicators of societal response. There is a lot of common in these frameworks as they shared roots in the stress–response framework originally introduced in a 1979 publication by Friend and Rapport for Canada Statistics (Bakkes *et al.*, 1994). In each framework, a causal chain is recognized whereby a distinction is made between forces that act on the environment, change as a consequence and take place in the environment as well as the societal reaction to those changes. Where the frameworks mainly differ is in the degree to which they subdivide the steps in the causal chain. Though the development of these frameworks has a contribution in their engagement with notions of causality, the criticism is too much simplify of cause and effect relationships which lack a full understanding of complexity of the real world and provide a little analytical guidance in the selection of indicators and establishment of ‘control points’ for monitoring and management of sustainability (Niemeijer & de Groot, 2008). In contrast, the Social-Economy-Environment theme framework emphasizes the multi-dimensional nature of sustainable

development and reflects the importance of integrating its pillars.

In general, all the above frameworks include a set of indicators or core indicators that make hard to judge the sustainability according to it. Thus, the indicators can be integrated into an index to provide highly condensational information about sustainable development (Chang *et al.*, 2009; IISD, 2006; OECD, 2004). Importantly, the selection of the indicators should be based on the evaluation of some criteria or guidelines as decision making process can be affected by the selected set of indicators (Chang *et al.*, 2009; IISD, 2006; Hezri, 2004; OECD, 2004). The fact is that there is no standard or commonly accepted method for indicators’ selection though some studies provide some criteria or guidelines. For example, OECD used three basic criteria such as policy relevance, analytical soundness and measurability (OECD, 2004). Moreover, different studies and organizations considered the following common criteria for the selection of indicators (CSD, 2001; OECD, 2004; Holman, 2009; United Nations, 2007; OECD, 1993; OECD, 1999; IISD, 2006; Hezri, 2004).

- Simplicity,
- Realistic description,
- Showing temporal & spatial trends,
- Ability of comparison,
- Technical and scientific adequacy,
- International standards compatibility,
- Easy calculation, and
- Existence of right quality data.

The comparison of sustainability assessment from different methodological frameworks cannot be done directly, making it difficult to select the best possible set of indicators that meets the goals of assessing sustainability at various levels. This is of concern, particularly for decision-makers who may want to develop or adopt a methodological framework of performance indicators for tracking the progress of sustainable regional

development. There is a great need for research in Malaysia to establish a standardized methodology for sustainability assessment and selection of SD indicators. Nevertheless, Malaysia has its own practices of sustainability indices namely Malaysian quality of life index (MQLI) and Malaysia urban sustainability indicator (MURNInet) by its own priorities and conditions, but given more emphasis towards sustainability of societal well-being rather than environmental and ecological aspects. The detailed of MQLI and MURNInet can be found in EPU Malaysia (2002; 2004) and Department of Town and Country Planning Peninsular Malaysia (2011).

Based on the sustainability frameworks reviewed, the Social-Economy-Environment theme framework might be adapted in Malaysia to measure the sustainability progress and performance of regional development because of its multi-dimensional and sectoral nature. The Social-Economy-Environment theme framework also provides importance to integrate three pillars of sustainable development which is in line with the importance placed on economic, social and environmental matters in the country's New Economic Model by achieving high income, inclusiveness and sustainability. As with its development achievements, Malaysia is gradually shifting its policy focus from environment to sustainability (Hezri & Dovers, 2011). However, regardless the adoption of Social-Economy-Environment theme framework, the methodological framework for assessing sustainable regional development should include multiple sectors and stakeholders, multiple dimensions of sustainability and multiple scales and meant to be generic and flexible, so that it can be applied across a range of issues, regions and local areas. Involving stakeholders in the assessment is important to understand the regional and local problems and constraints, build trust, and have impact on policy making processes (Reidsma *et al.*, 2011; Lebel *et al.*, 2006; Bouma *et al.*, 2007; Van Paassen *et al.*, 2007; Giller *et al.*, 2008). Stakeholders have a large role in discussing the selection of indicators

and policies, the weighing of indicators and evaluating the impacts on indicators (Sterk *et al.*, 2011; Verburg *et al.*, 2009; Paracchini *et al.*, 2011). Furthermore, the institutional context or governance such as laws and regulations, voice of civil society, role of media, public consultations, and other decision-making processes should also need to be considered.

Measuring progress towards SRD is an ongoing process. To date, in Malaysia, numerous programs and initiatives have been introduced to speed up sustainable and equitable development of regions. Therefore, the analysis of various methodological frameworks is necessary to assess sustainability with accuracy. The following challenges should be taken into account for developing regional sustainability frameworks by addressing their diversity:

- for whom, eg. general public or other policy sectors?
- what level, eg. regional, state, local, or organizational?
- for how long, eg. short, medium or long term?
- how to adapt and implement internationally available frameworks according to regional and local conditions and priorities,
- quality of data availability,
- cross-disciplinary knowledge integration,
- stakeholder participation,
- selection of indicators to represent the full picture of sustainability, and
- how regions are going to organize and manage their sustainable development in the long run.

Measuring sustainable regional development requires both simple measures that inform decision-makers about major trends and issues as well as more detailed measures to support in-depth analysis. However, simple and easily understood measures that do not compromise the underlying complexity of sustainable development have been difficult

to formulate. The fact is that regions in Malaysia have different perspectives on sustainable development which make matters more complex. Looking at the complexity and variation across regions provides information on how well the region as a whole is improving its quality of life, increasing its competitiveness, and making progress towards sustainability. Finally, the discussion of this article might be useful to provide a basis from which a comprehensive framework can be developed to guide the performance of Malaysia's regional development towards sustainability.

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