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SOCIOECONOMIC SUSTAINABILITY AS ENVIRONMENTAL PERFORMANCE INDICATORS

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Abstract. Environmental indicators are gaining importance for nation to measure quantitative evidence of environment conditions. Global Environmental Performance Index has established comprehensive indicators on measuring and tracking a country environmental performance. The two major objectives of Global EPI are to measure Environmental Public Health and Ecosystem Vitality performance. This paper intends to introduce and explain a new objective, known as Socioeconomic Sustainability that has been implemented in Malaysia EPI and highlights the rationale of having this objective. Later, the paper explains the new environmental performance policy category under the Socioeconomic Sustainability, including resource efficiency, environmental awareness and behaviour and environmental compliance. The paper concludes by outline the challenges associate with each new indicators.

Keywords Socioeconomic Sustainability, environmental performance indicators, resource efficiency, environmental awareness and behaviour, environmental compliance

1.0 INTRODUCTION

Environmental and development sustainability has grown to be a capstone to achieve economy prosperity of a nation. Hence, sustainable is a concept and thinking to guide the balance between development and preservation environmentally. Nevertheless, the measurement of environmental sustainability can be in varied way and challenging.

Since 2006, Environment Performance Index (EPI) quantifies and ranks the environmental performance regionally including both environmental health and ecosystem vitality of 133 countries. The ranked countries with EPI are up to 178 in 2014. EPI is developed by The Yale Center for Environmental Law and Policy and the Center for International Earth Science Information Network of Columbia University [1].

In Global EPI, the prior focus environmental protection objectives are Environmental Public Health and Ecosystem Vitality. Consider the sustainable covers the three aspects: Environment, Economic and Social, the Malaysia EPI introduces a new environmental objective of Socioeconomic Sustainability, covering resource efficiency, environmental awareness and behavior, and environmental governance (**Table 1.1**).

Objective	Policy Categories	Indicators
Socioeconomic Sustainability	Resource Efficiency	▪ Electricity Intensity Energy per GDP ▪ Industrial Water Consumption per GDP

		▪ Domestic Water Consumption per GDP
	Environmental Awareness and Behavior	▪ Environmental Awareness ▪ Environmental Behavior
	Environmental Governance	▪ Environmental Compliance

Table 1.1: Policy Categories and Indicators under Environmental Objective of Socioeconomic Sustainability

Malaysia is a developing country with rapid industrial and urban development, this has causes the highly deviated consumption of energy and reduction of energy efficiency. The socioeconomic development associated with the inadequately allocation of both social and economic forces entails considerable positive to negative impacts; as well as direct to indirect effects [2]. Apparently, the relationship between poverty (economic force), social capital and environmental sustainability are multifaceted [3]. Developing country such as Malaysia confronts some difficulties in eliminates the poverty against establishing sustainable environment. Meanwhile social capital needs to be improved so as to minimize poverty and achieve sustainable development at the same time. Considering the status of Malaysia as developing country, socioeconomic sustainability is importantly to be established for the benefits of all Malaysian. Hence, socioeconomic sustainability performance is urged to be well defined and measured in the context of EPI as environmental indicators.

2.0 THE NEEDS TO MEASURE SOCIOECONOMIC SUSTAINABILITY PERFORMANCE AS ENVIRONMENTAL INDICATORS

The definition of sustainability is initiated by in Brundtland report as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” [4]. The key idea of sustainability is associated with “triple bottom line” which conceptualized as 3BL or people,

planet and profit [5]. Nevertheless, in today definition of sustainability is multidimensional of three aspects in term of social, economic and environment [6]. This concept is synonymous with corporate social responsibility and ethically motivated activities [7]. For example, agricultural activity engages a close correlation with socioeconomic activity and environment itself [8] whereas other corporate activities such as industrial and commercial aspects are not excluded as well.

According to [9], the definition of sustainability is more subjected to local conditions and stakeholders:

"Because sustainability is not a "steady state" or fixed target, assessing it involves comparing the relative merits of different options, and achieving it allows for continued adjustment in response to changing conditions, knowledge, and priorities. Sustainability assessment requires an understanding of how dynamic processes interact under alternative trajectories and how interpretations depend on the priorities of stakeholders in a specific place and time."

As the evolution of sustainability, socioeconomic indicators in environmental performance context are to be proposed to fit in the market need of assessing the environmental performance for the decision makers, authorities and other stakeholders. The same aspiration was brought upon by [10] in which it is a natural duty of a nation to clarify a standard guideline towards sustainability; notably of local socioeconomic conditions, local environment quality and quantity of resources, culture and stakeholders' behavior in production and consumption of goods and services accordingly.

Expanding the example of agricultural activity, farmers utilize land for agricultural purposes and maintain prosper production capacity. Resources including soil, energy, and water are consumed during the process. Forward, the healthy management of resources and environment are to ensure the consistency and sustainable production capacity as well [8]. Therefore it can be considered that agricultural development must be equilibrium among soils, ecosystem and socioeconomical environment [11]. So does other corporate activities including industrial and commercial as well as domestic activity.

In this paper, the socioeconomic sustainability indicators of Malaysia EPI based are reviewed and proposed. In previous study, socioeconomic sustainability indicators has been proposed for bioenergy [9], fishery [12]; this study reviewed socioeconomic sustainability indicators in measuring environmental performance.

3.0 SELECTION OF INDICATORS

The proposal of indicators is mainly based on the availability and accessibility of information of each socioeconomic sustainability indicators accordingly to existing policy categories. From the previous findings of selection of indicators [13], there are few key elements that needed to be notified:

I. Practical (easy to measure)
II. Sensitive and responsive to stresses of system
III. Anticipatory of impending change
IV. Predictive of changes that can be averted by management actions
V. Comprehensiveness of indicators and integrative with socioeconomic sustainability
VI. Measureable and known variability in responses to change
VII. Low variability in responses

Therefore, the indicators are selected and proposed in line with these key elements as guideline to ensure the reliability and consistency of the selection criterion. Further improvement and addition of indictors are more systematic by following this standard as well as to mitigate the ambiguousness of the information and analysis.

3.0 PROPOSED POLICY CATEGORIES AND INDICATORS FOR SOCIOECONOMIC SUSTAINABILITY

3.1 Resource Efficiency

The engagement of the policy for a better decision making system in evaluation of environmental impact is to be resource efficiency oriented [14]. Resource efficiency focuses on the processes in which resources are used to achieve maximum value optimization by limiting and reducing amount of resources needed, and emissions and waste generated, per unit of product or service. National Energy Policy (1979) aims at the three prior objective which are supply objective, utilization objective and environmental objective. The aim of the utilization objective is to promote efficient utilization of energy and discourages wasteful and non-productive patterns of energy consumption. While passing of the time, Malaysia government focuses on improving energy efficiency in the industry sector and to encourage efficiency in energy production, transportation, conversion, utilization as well as consumption through various awareness programmes [15].

Policy Category	Potential Related Condition	Explanation
Resource Efficiency	Electricity Intensity Energy per GDP	To measure the quantity of electricity required per unit output of GDP
	Industrial Water consumption per GDP	To measure the average volume of water consumption engaged in industrial sectors
	Domestic Water Consumption per capita	To measure the volume of water that of each person daily use
	Natural Gas Consumption (mmBtu)*	To measure the natural gas consumption of each

	Sources: Malaysia Energy Information Hub	sectors: residential, commercial and industrial

Table 3.1: The Indicators in Policy Category of Resource Efficiency

*New proposed indicators

3.2 Environmental Awareness and Behavior

Environment awareness is way too simplified to reveal a better picture of environmentalism trend among Malaysia public. People who aware and sensitive about the environmental issues would tends to practice and behave environmentally-friendly way [16]. However, those who are of environmentally concern to their close environment are more environmentally-behave shifted. In line with this concept, the most widely promulgated of environmental concern is addressed by [17], [18]. Later, a measurement of endorsement of a "pro-ecological" world view (or environment concern) called new environmental (or ecological) paradigm (NEP) is proposed to reveal the environmental concern of the people. This scale consists of 15 structured items that statistically measure the environmental world view (or paradigm).

As for environmental intention, according to Theory of Planned Behavior (TPB) [19], human environmental intention and behavior is determined from the anticipation of antecedents of attitudes, subjective norms and perceived behavioral control. According to this model, there is a systematic and holistic construction of questionnaire covering form attitudes, subjective norm and perceived behavioral control to measure the environmental intention. The model is shown as below (**Figure 3.1**):

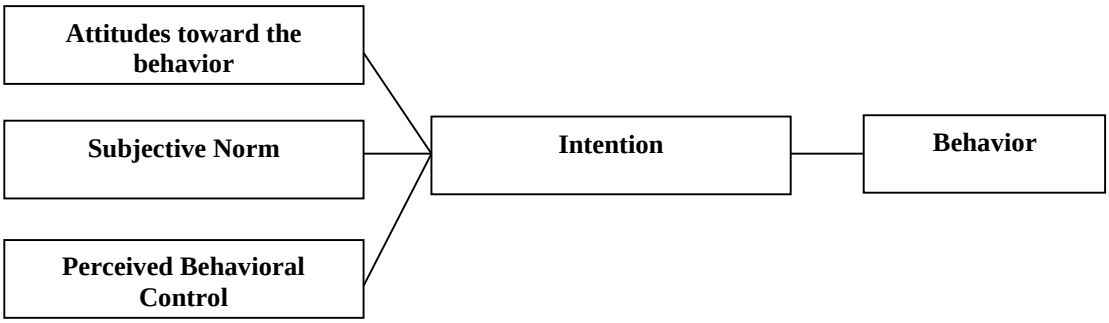

Figure 3.1: Theory of Planned Behavior

Policy Category	Potential Related Condition	Explanation
Environmental Awareness and Behavior	Environmental Awareness	To measure the public knowledge related to environment
	Environmental Behavior	To measure the environment behavior covering four aspects: water, waste, air and climate change
	Environmental Concern*	To measure the environmental concern among Malaysia public.
	Environmental Intention*	To measure the intention and motivation of Malaysia public to preserve the environment.

Table 3.2: The Indicators in Policy Category of Environmental Awareness and Behavior

*New proposed indicators

3.3 Environmental Governance

Under Environmental Quality Act (1974), this indicator measures the environmental compliance of industrial sectors in complying Malaysia environmental laws and regulations with regards to Water Quality, Air Quality and Toxic and Hazardous Waste. Annual percentage average of environmental compliance is computed accordingly to the groups of industrial sectors. Therefore, the environmental attitude trend of both private and government sector while contributing to economic growth is revealed [20].

4.0 CONCLUSIONS

The existing socioeconomic sustainability indicators of EPI are required refinement and continuous improvement [20]. The proposed new indicators are selected based on the availability and accessibility of data in Malaysia. Consequently, there are inevitably some hidden challenges in applying new socioeconomic sustainability indicator, notably regarding the issue of data availability. Indicators such as environmental behaviour and environmental concern would require nationwide survey to collect data and consisted of large sample size. Moreover, the new proposed indicators pinpoint a more detailed and diversified overview of environmentalism. Hence, there might increase the simplification of questionnaire survey. Bias that could be spouted will need to be notified. In whatever so, the proposal of new socioeconomic sustainability indicators is looked upon in coming future; diminishing of possible hidden challenges meanwhile considering the openness and simplification of analysis results.

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