

The Role of Policy Mix in Driving Sustainable Development: Idealism or Realism?

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The recently released Environmental Performance Index 2020 by Yale Center for Environmental Performance Index has ranked Malaysia 68th amongst 180 countries, 6th in the Asia-Pacific region. The conclusion was made based on a data-driven summary, encompassing the evaluation on the 32 key performance indicators across 11 issues categories on environmental health and ecosystem vitality. Over the past few decades, Malaysia has shown a clear intent of its commitment on sustainable development through the introduction of national-level policies, standards, blueprints, and plans as well as pledging to global efforts for sustainability such as UN 2030 Sustainable Development Goals, Paris Agreement, and Kyoto Protocol. The impact evaluation for the public policies is often deemed to be challenging due to the lack of resources, high complexity of institutional frameworks and its execution, and the uncertainties in the timeframe to capture the respective impacts. This work applies Drivers, Pressures, State, Impact and Response Model of Intervention (DPSIR) to evaluate the impacts of the Malaysia policies in environmental health and ecosystem vitality leading to the conclusion made by EPI 2020. Various policies are introduced and implemented over the years in Malaysia for each of the EPI issue categories, but the impacts appeared to be small and ineffective, especially in ecosystem vitality area that includes biodiversity and climate change issues. While the progress on environment health area, particularly air quality and waste management standing is better, more improvements is expected to improve the standing in the EPI internationally. The outcomes of this study serve as a reference for the local authorities in refining the policy agendas, facilitate communications with key stakeholders to enhance the environmental performance of Malaysia for sustainable development. The analysis and evaluation on the impacts of policies on the respective indicators also offer industry players and practitioners the opportunity for cleaner production and green innovation.

1. Introduction

Sustainability is defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs” (Brundtland, 1987). 2030 Agenda for Sustainable Development is the successor of the Millennium Development Goals (MDGs), that was developed as the roadmap of the United Nations Millennium Declaration signed by 189 countries in September 2000. Millennium Declarations focuses on the social dimension and devote world leaders to combat poverty, hunger, gender inequality, diseases, child mortality rates, illiteracy, environmental degradation, and to develop a global partnership for development (Lomazzi et al., 2014). 2030 Agenda for Sustainable Development was later introduced in September 2015 with the agreement of 193 Member States of UN to replace the Millennium Declaration. Sustainable Development Goals (SDGs) build on the successes of the MDGs and further expanded the framework to tackle the more recently social, economic, and environmental challenges lead up to Year 2030 (Laptev et al., 2021). The 17 Sustainable Developments Goals and 169 targets are applicable to all countries, regardless of their differences in term of national realities, capabilities and levels of development while also respecting the national policies and priorities (United Nations General Assembly, 2015). SDGs strive towards the target of 5P commitments, which is people, planet, prosperity, peace, and partnership. Among the 5Ps, partnership carries the utmost

importance, especially on the knowledge transfer and sharing from developed and technology advanced countries to the poorest and most vulnerable nations.

Environmental Performance Index (EPI) is an international composite environment index that was developed jointly by Yale University and Columbia University to evaluate environmental sustainability relative to the paths of other countries (Wendling et al., 2020). EPI was preceded by Environmental Sustainability Index (ESI). It was mainly designed as a powerful policy tool in support of efforts to meet the targets of United Nations from MDGs to SDGs and to ensure the movement of society towards a sustainable future. It provides policymaker from around the world a concrete idea of ways to spot a problem, set targets, track trends, understanding outcomes as well as to identify the best policy practices. The most recent published 2020 EPI report had ranked 180 countries by using 32 performance indicators across 11 issue categories based on two policy objectives which includes environment health and ecosystem vitality. Environment health measures threats to human while ecosystem vitality measures the natural resources and ecosystem services. It provides a data-driven summary of the state of sustainability around the world. The overall EPI rankings not only indicate which countries best address the environmental challenges, but also allows good performing countries to become a role model for others in refining their policy choices regarding the environmental issues. Countries included in the EPI report can use the results to reflect on the alignment of the national environmental policy with the common aim of achieving the 17 SDGs.

Malaysia was the 82nd member that joined as a Member State of United Nations. Malaysia displays a strong support and commitment in embracing the aim and purposes of UN to promote international peace and encourages the principle of multilateralism. Some highlights of the active involvement in UN includes participation in over 30 United Nations peacekeeping mission as well as elected to the UN Security Council for four times, with the most recent time from 2015-2016. Malaysia view UN as the most constructive intergovernmental platform to share the common beliefs and create a mutual-benefitting relationship among other Member States of UN (KLN, 2016). One of the most significant well-known blueprints that was introduced in Malaysia was known as Wawasan 2020, also can be translated as Vision 2020. It was introduced by the fourth Prime Minister Tun Dr. Mahathir bin Mohamad in 1991, with the aims to turn Malaysia into a fully developed nation by Year 2020 (Mohamad, 1991). Vision 2020 resonates well with the goals and agendas under MDGs and the SDGs. Under the leadership of different prime minister, Malaysia has put in tremendous effort in creating and introduce various nation-wide policies and thorough implementation guidelines within the country to make Vision 2020 a reality. Nonetheless, there has been limited literatures that investigate and evaluate the effectiveness and impacts of policy mix in driving the sustainable development in Malaysia. The main objective of this work is to examine the drivers and pressures of local authorities to introducing sustainability-related policies, the current state and impacts of the policy mix in driving sustainable development through comparison of Malaysia's performance on the overall environment health and ecosystem vitality as reflected in EPI, and to propose responses and recommendations to further enhance the effectiveness of policy mix in driving sustainable development. This work contributes as a reference for local authorities to improve and pinpoint the execution gap between the policy agenda and its implementation while also help to facilitate the communications among key stakeholders to further enhance the environment performance of Malaysia for sustainable development. It also helps industry players and practitioners to understand the causal and interactions between policies on society and the environment and increase their awareness on the urgency for cleaner production and green innovation. It can also act as a catalyst for government and stakeholders to review on the current capacity and capability of both government and societies towards environment sustainability to generate a better allocation of resources and budget towards environmental issues. The rest of the paper is structured as follows: Section 2 – Idealism - Malaysia ideal blueprints towards sustainable development; Section 3 – Methodology - DPSIR Framework; Section 4 – Realism - Analysis of feasibility and achievement towards sustainable development and Section 5 – Conclusion - Prospect, recommendations, and future works.

2. Idealism – Malaysia blueprints towards sustainable development

Malaysia has a consistent planning system in the cascading development blueprints ranging from long-term, to medium term, to short term. The long-term vision, such as Vision 2020, Shared Prosperity Vision 2030, and the National Transformation Vision 2050 addresses the priorities of the vision, which then define the directions of the short-term plans, 5-year development plan – Malaysia Plan. Vision 2020 is introduced with the aim to conserve and preserve the valuable natural resources that Malaysia is well-blessed with. Even though the term “sustainable development” was not used in the original document of the previously mentioned policies due to the newness of the term back then, the key areas such as air quality, waste management, biodiversity and climate change are the common concerns evaluated under environment health and ecosystem vitality in EPI. Rapid industrial development causes air quality appeared as an important concern and environmental threat to human health. As mentioned in the 8th Malaysia Plan by EPU (2006), policymakers aim to phase out leded

petrol and further decrease the sulphur content in diesel. The commonization of natural gas distribution network in Malaysia and the adoption of clean coal technology in certain power plants are encouraged to reduce the emission. Besides, Malaysia's government also aim to exert new approaches in terms of air quality management such as the introduction of air quality zones and air shed management. Clean Air Action Plan (CAAP) was developed as the means to improve air quality through the reduction of motor vehicles emissions, industrial emissions, and prevention and control of haze due to open burning and forest fire (EPU, 2010). It was later intensified to focus on reducing emissions, preventing haze pollutions, building institutional capacities and capabilities, as well as to strengthen the public awareness (EPU, 2010).

Waste management as one of the important solutions to aid sustainability development joins the 2020 EPI as a new metric that filled in the notable gap in the EPI framework under environmental health. The emergences of waste because of increasing world population causes health implications and environmental damages (Fan et al., 2019). Malaysia had been aware of the importance of waste management towards the country and had launched the Malaysian Agenda for Waste Reduction (MAWAR) Program in 1996 as a means to encourage various industries to formulate strategies to reduce waste. It was later replaced by National Strategic Plan for Solid Waste Management (NSPSWM) that aims to formulate policies, strategies, and plan of action as a guideline for all respective stakeholders (EPU, 2010). In the 10th Malaysia Plan published by EPU (2010), Malaysian government attempt to restructure the section with the federalization of solid waste management and public cleansing, as well as full enforcement the Solid Waste and Public Cleansing Act 2007. 11th Malaysia Plan embrace the idea achieving green growth, introducing a new concept known as sustainable consumption and production (EPU, 2015). It plans to manage waste holistically based on life cycle approach and aims to increase recycling and recovery rate of waste as well as to improve the management of landfills to keep waste and pollution at a minimum level. Biodiversity and habitat support all ecosystem services and serve as the pillar of all human activities. It increases the stability of ecosystem functions through time (Cardinale et al., 2012). The National Biodiversity Policy 1998 provides framework to integrate and consolidate biodiversity projects or program in Malaysia (EPU, 2010). Some examples include biodiversity conservation projects as well as the establishments of national parks, the introduction of Guidelines for Access and Benefit Sharing (ABS) of Biological Resources are developed in the 9th Malaysia Plan period to combat the issue of biopiracy and to ensure the conservation and sustainable utilization of the nation's ecological assets (EPU, 2006). As Malaysia is blessed with rich biodiversity resources in both forest and marine areas, the government adopted the Common Vision on Diversity to strengthen the Protected Areas System, landscape and seascape management, and mainstreaming biodiversity (EPU, 2010). In the 11th Malaysia Plan published by EPU (2015), the Government also commits to further intensify the conservation efforts to protect the endangered plants and wildlife species to ensure that future generations will have the same access to these resources as the population today. Climate change is undoubtedly the most discussed issues when it comes to sustainable development as it aggravates all other environment issues mentioned in the EPI that ultimately could threaten the existence of human society in the world. In combating the issue of climate change, Malaysia ratified its commitment to the Kyoto Protocol on September 2002, which is an agreement that operationalizes the United Nations Framework Convention on Climate Change that aims to reduce the emission of greenhouse gases that ultimately cause global warming (EPU, 2006). Malaysia took a bold move for a voluntary reduction of up to 40 % in terms of emissions intensity per unit of GDP by the year 2020 relative to the emission levels in 2005 with funding and necessary technology transfer coming from developed countries during the Conference of Parties (COP15) in 2009. Along with the introduction of National Climate Change Policy in 2009, the government of Malaysia introduce a comprehensive AFFIRM Framework of Awareness, Faculty, Finance, Infrastructure, Research, and Marketing to develop a complete ecosystem for environmental sustainability (EPU, 2010). With regards to the fact that climate change impact is cross-sectoral in nature, the respective government agencies also develop a national climate change adaptation plan to particularly synergize adaptation efforts across relevant ministries and agencies (EPU, 2016). Malaysia hopes to enter the ranks of advanced economies in 2020 with an economy resilient to the negative impact of climate change.

3. Methodology – DPSIR framework

DPSIR framework is a systems-thinking framework that assumes cause-effect relationships between interacting components of social, economic, and environmental systems (Bradley and Yee, 2015). DPSIR is the extension of the Pressure-State-Response (PSR) model that developed by OECD (1993). It started to gain popularity as the model was adopted by agency such as European Environment Agency which specializes in produce assessments based on quality-assured data of environmental problems. DPSIR is considered a wide-ranging tool applicable to most types of environment issues that is capable of evaluating the causal and interactions between policies on society and the environment as reflected in the case study of using DPSIR for marine environment management (Patrício et al, 2016). Jago-on et al. (2009) also employed the framework to analyze

the interaction of subsurface environment such as the quality and the quantity of the groundwater. It helps to pinpoint the occurrences of subsurface problems in metropolitan areas in Asia and came out with suggestions to ease the effort for environmental sustainability. In this work, DPSIR had been applied towards 4 EPI Issue categories which Malaysia had been putting effort on for the past 2 decades in the journey to achieve environmental sustainability. Table 1 below summarizes the results of the evaluation on Malaysia's policy mix in tackling these 4 issues categories using DPSIR framework.

Table 1: DPSIR Framework on Malaysia's Effort towards environmental sustainability (own sources)

| DPSIR | EPI Issue Categories | | | |
|----------------|---|---|--|---|
| | Air Quality | Waste Management | Biodiversity and Habitat | Climate Change |
| Driving Forces | Climate, Industry, Fossil Fuel Consumptions | Population concentration, Governance, Circular Economy awareness | Agriculture, Forestry, Land use planning | Oil and gas extraction and consumption, Agriculture, Industry |
| Pressures | Atmospheric discharges, Transboundary haze and forest fire | Contaminated and hazardous discharges, Resource use and recycling, Landfills | Deforestation, Land development, Animal and plant poaching | Atmospheric discharges, Land use changes |
| State | Air Quality Index (AQI), Atmospheric CO ₂ levels, | Sanitary landfills and disposal treatment facilities, Waste and contaminants generation | Species' population, Quality and structures of habitats | Atmospheric CO ₂ levels, Temperature |
| Impacts | Global warming, Human sickness | Environmental pollution, Loss of non-renewable natural resources | Loss of habitats or species, Soil erosion | Environmental degradation, Human sickness |
| Responses | Clean Air action plan, Environmental Quality regulations and policies | 3R awareness and education program, Resource use management | Land use management, Conservation projects and initiatives | AFFIRM Framework, Progressive environmental and conservation policies |

For example, the driving forces of air quality in Malaysia are mainly the climate and industry influences, as well as fossil fuel consumptions. The driving forces then creates pressures such as atmospheric discharges, transboundary haze and forest fire, which then affects the state of the air quality, which is AQI and atmospheric CO₂ levels. These environment states will generate impacts such as is global warming and human sickness, which then triggers the responses of the Government, which is the relevant policy mix. The responses by the Government will have different degree of effect towards each segment among DPSIR. The DPSIR analysis can be applied again over the time as it allows the identification of progressive efforts made by Malaysia towards environment sustainability through a variety of policy mix and improvement can be reflected in future analysis.

4. Realism – Analysis of feasibility and achievement towards sustainable development

Malaysia was ranked 68th out of 180 countries in the EPI Report 2020. Malaysia's standing on the environment health and ecosystem vitality as well as the respective issue categories was shown in the Table 2 below. The score in each category is graded according to their own distinct indicators, as listed in the EPI 2020 Report. Based on the Table 1, Malaysia's ranked better on environment health section compared to ecosystem vitality section in the EPI 2020 report. Due to the data and methodological improvement to each subsequent version of EPI, the country scores itself cannot be utilized in time-series analysis. The indicators with its weightage for air quality in EPI includes 55 % from PM_{2.5} Exposure, where PM_{2.5} indicates particulate matter with a diameter of 2.5 µm or less, 40 % from Household Solid Fuels, and 5 % from Ozone Exposure. The scores of Malaysia for PM_{2.5} Exposure and the Household Solid Fuels have improved gradually over the years, but the scores for Ozone Exposure indicator had started to fall since 2010. This indicates that the ozone pollution problem in Malaysia is getting more serious over the year. It is entirely possible where ozone level increases while PM_{2.5} decreases due to the reaction of PM_{2.5} from primary emission sources with free radicals that responsible for ozone formation (Zhang et al, 2019). It is observed that even though CAAP is introduced in 2010 to improve air quality, after the execution of multiple strategies and policies according to the action plan over the years, the improvement pace on PM_{2.5} Exposure and Household Solid Fuels remains identical pre-2010 and post-2010. This reflects the low effectiveness as well as the efficiency of the execution, enforcement, and implementation

phase for the CAAP. For waste management categories, there is only a single indicator in EPI, which is controlled solid waste. The non-toxic household or commercial waste is count as “controlled” as long as it is treated in a manner that allows the mitigation of environment risks. Even though this issue category is relatively new, it is going to gain a greater weightage in the EPI in the future as the world is expected to generate 2.59 Gt of waste annually by 2030 (Kaza et al., 2018). By adapting to the SCP concept, Malaysia managed to achieve the 30 % target of national recycling rate of household waste by the year 2020 (EPU, 2021) through enhancing the public awareness of reuse, reduce, and recycle waste and increasing coordination of sustainable waste management between the relevant agencies in Malaysia. Malaysia’s general performance in the EPI 2020 report on Ecosystem Vitality section is low, especially in the Biodiversity and Habitat area. There are a total of 7 indicators for Biodiversity and Habitat category and the country’s measures towards maintaining natural ecosystems and protect the full range of biodiversity within their borders is accessed accordingly. While numerous conservation projects led and promoted by Ministry of Natural Resources and Environment has been carried out over the years from 2001 – 2020, the results shown that outcome is less than satisfying. For example, in the 12th Malaysia Plan, instead of at least 10 % of coastal and marine areas as well as 17 % of terrestrial and inland water areas to be gazetted as protected areas, Malaysia only managed to achieve 5.3 % and 10 % (EPU, 2021). This resonates with the EPI 2020 results as Malaysia’s scores on Species Habitat Index and Biodiversity Habitat Index indicator is on the trend of decreasing over time. This highlights the need for the Malaysian government to review the enforcement and implementation of policy mix in biodiversity and habitat conservation efforts to improve the biodiversity level in Malaysia. There are a total of 8 indicators in EPI for Climate change category. 5 of them includes the growth rate of greenhouse gas (GHG) emissions of carbon dioxide (CO₂), methane (CH₄), fluorinated gases (F-gases), nitrous oxide (N₂O), and the growth rate of pollutant known as black carbon. Another 3 indicators are separately growth rate in CO₂ emissions from land cover, GHG intensity growth rate as well as GHG emissions per capita. Besides than the scores of carbon dioxide growth rate and GHG intensity growth rate are improving over the years, it is observed that the indicator scores reflect a decreasing trend over the years, especially since the year 2012. The improvement of the scores in GHG intensity growth rate aligned with the commitment of Malaysia’s reduction of up to 40 % in terms of emissions intensity per unit of GDP relative to the emission levels of 2005 and by the year 2020. The 12th Malaysia Plan report records a successful of 29.4 % reduction (EPU,2021). The mitigation efforts towards the consequences of climate change, particularly floods have been an area of focus in the recent Malaysia Plan. The recent incidents of heavy floods during December 2021 have caused at least 50 dead, evacuation of about 400,000 people, as well as an estimate of RM 6.1 billion in financial losses (Rahman, 2022). It is evident that the mitigation strategy is a correct action plan as the aftereffects of global warming and climate change would not only increase the risk of floods, but also exacerbate the situation of floods (Hirabayashi, 2013). The latest 12th Malaysia Plan report indicates significant investments as much as RM1 billion is allocated for climate resilience enhancements and mitigation projects (EPU, 2021). The EPI results reflect that it is necessary to strengthening the institutional AFFIRM Framework to combat the issue of climate change, especially in areas of infrastructure and research in order to curb and relief the climate change progress.

Table 2: Malaysia’s scores, regional and global rankings on 4 EPI Issue Categories (EPI, 2020)

| EPI Policy Objectives | Policy Objectives Ranking | Issue Categories | Scores | Asia-Pacific Regional Ranking | Regional Median | World Ranking |
|-----------------------|---------------------------|--------------------------|--------|-------------------------------|-----------------|---------------|
| Environmental Health | 50 / 180 | Air Quality | 50.3 | 6 / 25 | 32.1 | 55 / 180 |
| | | Waste Management | 81.4 | 4 / 25 | 27.2 | 33 / 180 |
| Ecosystem Vitality | 108 / 180 | Biodiversity and Habitat | 55.1 | 12 / 25 | 53 | 110 / 180 |
| | | Climate Change | 52.8 | 6 / 25 | 40.2 | 81 / 180 |

5. Conclusion - Prospect, recommendations, and future works

In this work, DPSIR model is employed to evaluate the effectiveness of utilizing policy mix in driving sustainable development in Malaysia. Through the identification of the drivers, pressures, state, impacts, and responses of the policies in air quality, waste management, biodiversity and habitat, and climate change area and the comparison with its result shown in EPI 2020 report, the framework highlighted the gaps where Malaysian government should emphasize to encourage sustainable development. Even though the DPSIR Framework was often criticized that it oversimplifies the problems attempts and attempts to capture all process in causal-effect relationship, which results in bias towards the physical dimension of environmental issues and overlooked

the societal dimension, the clear structure of the framework helps to identify and locate the gaps in policy mix clearly. The future works will focus on the extension of the DPSIR framework to involve the societal dimension of environmental issues to better evaluate the sustainable development progress in Malaysia. EPI will continue to work as a great guideline for government, policymakers, researchers as well as the stakeholders to identify the method to improve the performance in different indicators for sustainable development. A detailed comparison with other Asia-Pacific countries also encourages Malaysia to practice knowledge transfer and technology sharing as well as to encourage more cross-boundary research study or projects to improve the overall Asia-Pacific standing in sustainable development. DPSIR Framework also helps policymaker to identify Malaysia's overall causal-effect relationship towards the 4 issue categories in the EPI.

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