SIMULATION MODEL OF ENVIRONMENTAL SUSTAINABILITY IN MALAYSIA AND SARAWAK USING SYSTEM DYNAMICS

RESEARCH MANAGEMENT INSTITUTE

UNIVERSITI TEKNOLOGI MARA

40450 SHAH ALAM, SELANGOR

MALAYSIA

BY

ASSOCIATE PROFESSOR DR. MARGARET CHAN KIT YOK
ASSOCIATE PROFESSOR DR. YAP BEE WAH
TING SIEW KING
WONG MUI HUNG
ELLY LAWAI

JANUARY 2012

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ABSTRACT

The Third Principle which is pertaining to the right to development in Agenda 21 of the Rio Declaration or Earth Summit asserts that it must be fulfilled so that development must be sustainable which has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own need. Among the various models of comparative studies of environmental sustainability was the Environmental Performance Index (EPI) model. Malaysia was ranked 54 recording a score of 65 and ranked 10 among the Asia and Pacific Countries behind two ASEAN countries: Singapore and Philippines. The environmental indicators from 2010 EPI was therefore used to develop the System Dynamics Simulation Model to provide the framework and procedure for qualitative and quantitative description, exploration and analysis of the systems in terms of their processes, information boundaries and strategies, facilitating quantitative simulation modelling for policy evaluation and predictions pertinent to sustainability. The System Dynamic Simulation Model developed for the EPI of Malaysia changed the static presentation to a dynamic scenario. Two very important components were considered: the contribution and the impact of population and the industrial activities indicated as the Industrial Productivity Index. The simulated EPI of 66.51 was shown to differ slightly from the EPI 2010 of 65 attributed to the inclusion of the population and the industrial production factors in the system dynamic model, in which the later study did not compute the EPI with respect to the two factors. Thus, the System Dynamic Simulation Model developed has shown to be reliable and be used for any country to simulate EPI for future trends. The simulation of the EPI using the system

CHAPTER ONE

1.0 INTRODUCTION

Malaysia is striving to attain the status of a fully developed nation by 2020 and currently is in the transition from labour-intensive and assemble-type production to capital and technology intensive production, and finally to the knowledge-based economy. Malaysia ranks higher among the emerging economies. During the 2004 – 2007 periods, the GDP grew from RM427 billion to RM 504 billion. The rapid industrial progress is also followed by a population increase from 18.38 million to about 26 million in 2008. The increase in population and economic growth has resulted in the increased demand for goods and services, which in turn lead to increase in waste generation and pressure on the natural resources and stresses to the environment. Currently, the Malaysian Government is adopting a holistic management of the environment and natural resources through the setting up of many agencies in the collection and compilation of data pertaining to demographic changes, industrial production, agricultural production and the supply of water and electricity.

In the global scenario, the calamity of mother earth is the suffering from water woes, loss of biodiversity, depletion of natural resources and global warming that resulted in natural disasters. With the world population standing at 6.92 billion growing at an estimated rate of 74 million per year expecting to reach 9.2 billion by 2050, there is concern over the rapid agriculture and industrial development to support the population. The global warming is largely attributed to the increase of greenhouse gases consisting of carbon dioxide and methane in the Earth's ozone layer

CHAPTER TWO

LITERATURE REVIEW

2.0 INTRODUCTION

Since the recognition of impact of greenhouse effect on the earth that causes global warming leading to the drastic environmental changes due the rapid industrialization and modernization globally and the many incidences of natural catastrophes, there was an awareness of the need for sustainable development to ensure a clean environment for health and conservation of natural resources and biodiversity.

2.1 History of Sustainable Development in the United Nations

As early as 1972, the United Nations held a conference to address the human environment in Stockholm that brought industrialized and development nations to establish the declaration of the human family rights to a healthy and productive environment. Subsequently, the International Union for Conservation of Natural Resources documented the precursor to the concept of sustainable development and asserted that conservation of nature cannot be achieved without development to alleviate poverty and misery of hundreds of millions of people and stressed the interdependence of conservation and development in which development depends on caring for the Earth, (IUCN, 1980). This brought the Brundtland Report released by United Nation which wove together social, economic, cultural and environmental issues and global solutions, reaffirming that "the environment does not exist as a sphere separate from human actions, ambitions, and needs, and therefore it should not