THE EFFECT OF SUSTAINABLE DEVELOPMENT ON ENVIRONMENTAL AGENDAS. CASE STUDY: PUTRAJAYA GREEN CITY

BY

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ABSTRACT

During the past four decades, the relationships between the evolution of development strategies and environmental concerns within the urban context. Urbanization increases the pressure on limited resources and available services, and threatens health, the environment and urban productivity. This study is a descriptive study that more emphasis to the elaboration of an issue of concern and interest in relation to the implementation of the Green City Program in Putrajaya. This study will use a qualitative study and it will rely on analytical approach. The data will collected from research report, government report, scientific article and from others reliable sources. Nowadays, as a result of this development, studies about the aspects of sustainable development are increasing. Sustainable development is popularly described as "a development that meets the needs of the present without compromising the ability of the future generations to meet their own needs" (WCED, 1987 *in* Moffat, 1996). Malaysia is actively engaged in international pacts concerning sustainable development efforts. As a result, the Malaysian Government's sustainability agenda has prioritized the balance between socio-economic and ecological systems to avoid further environmental damage.

ABSTRAK

Sejak empat dekad yang lalu, hubungan di antara evolusi strategi pembangunan dan alam sekitar telah dibincankan dalam konteks bandar. Pembandaran meningkatkan tekanan ke atas sumber yang terhad dan perkhidmatan yang ada, dan mengancam kesihatan, alam sekitar dan produktiviti bandar. Kajian ini merupakan kajian deskriptif yang memberi penekanan kepada penghuraian isu yang menjadi perhatian dan kepentingan berhubung dengan pelaksanaan Program Bandar Hijau di Putrajaya. Kajian ini akan menggunakan kajian kualitatif dan ia bergantung kepada pendekatan analitikal. Data ini dikumpul dari laporan penyelidikan, laporan kerajaan, artikel saintifik dan daripada pelbagai sumber yang boleh dipercayai. Pada masa kini, hasil daripada perkembangan ini, kajian mengenai aspek pembangunan lestari semakin meningkat. Pembangunan mampan adalah popular digambarkan sebagai "pembangunan yang memenuhi keperluan masa kini tanpa menjejaskan keupayaan generasi akan datang untuk memenuhi keperluan mereka sendiri" (WCED, 1987 di Moffat, 1996). Malaysia terlibat secara aktif dalam pakatan antarabangsa mengenai usaha-usaha pembangunan yang mampan. Akibatnya, agenda kemampanan melalui usaha daripadanKerajaan Malaysia telah memberi keutamaan keseimbangan antara sistem sosio-ekonomi dan ekologi untuk mengelakkan kerosakan alam sekitar lanjut.

DEDICATION

This project paper is dedicated to my beloved parents, Rogayah Binti Rabaie and Azmi Bin Morshidi. Both of you have always been in my heart and soul, forever and ever. This journey would not have been possible without your spirit and inspiration.

To my brothers and sisters, Muhammad Aqmarul Afif, Nurul Akma Izzati, Muhammad Aqmarul Azib and Nurul Akma Izzazi, may the principles and insights contained in this journey bring you clarity, balance, focus, and confidence to help you accomplish your greatest dreams and create a meaningful transformation in your life.

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List of Abbreviations

3R	Reuse, Reduce, Recycle
BaU	Business as Usual
CASBEE	Comprehensive Assessment System for Built Environment Efficiency
CO^2	Carbon Dioxide
ERL	Express Rail Link
EV	Electric Vehicles
FAO	Food and Agriculture Organization of the United Nations
GBI	Green Building Index
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	greenhouse gas
HEMS	Home Energy Management System
HV	Hybrid Vehicles
IAEA	International Atomic Energy Agency
IBS	Industrialized Building System
ICT	Information and Communication Technologies
IMO	International Maritime Organization
IPCC	Intergovernmental Panel on Climate Change
ITS	intelligent transportation system
KeTTHA	Ministry of Energy, Green Technology and Water Malaysia
LAs	Local Authorities
LEED	Leadership in Energy and Environmental Design
MDGs	Millennium Development Goals
NGOs	Non-Governmental Organization
PGC2025	Putrajaya Green City 2025
PJC	Putrajaya Corporation
QL	Quality of Life
SDGs	sustainable development goals
SWM	solid waste management
TNB	Tenaga Nasional Berhad
UHI	urban heat island

UN	United Nations
UNDESA	United Nations Department of Economic and Social Affairs
UNDESD	United Nations Decade of Education for Sustainable Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UN-HABITAT	UN Human Settlements Programme
UNIDO	UN Industrial Development Organization
VMT	vehicle mile travel
WCED	World Commission on Environment and Development
WMO	World Meteorological Organization

CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

Malaysia's is often hailed as an example of developing a successful country in Asia. Malaysia has started to concern in environmental issues since colonial times. The stress for sustainable development given in the Seventh Malaysian Plan (1995-2000) and the formulation of the Total Planning Doctrine (Zainuddin, 1995 *in* Foziah, 2004) indicates that the concern for the environment begins to gain firmer ground. The relationships between men, the Creator and the environment is the focus of the integration of spiritual value into development discussed in Total Planning Doctrine. Moreover, in recent years, to lower pollution and resolve environmental issues, the established cities around the world have been attempting to find green solutions.

The term of 'green city' has become increasingly popular in recent years, although it has worked out and implemented in western country since the early 1990's. In Malaysia, the term was first brought to the public when it was announced by Datuk Seri Mohd Najib Bin Tun Abdul Razak, the Prime Minister when tabling the Tenth Malaysia Plan ago and has declared

Cyberjaya and Putrajaya as a model pilot (Berita Harian, 9 Mei 2011). Putrajaya Corporation President cites keynote address; Hon. Tan Sri Samsudin bin Osman, when Hon. The Prime Minister declared Putrajaya and Cyberjaya will serve as a pilot city, for example the development of other cities, "we receive good at the Putrajaya Corporation to achieve this. Though much work needs to be improved, we believe that Putrajaya is a solid foundation to become a green city." At the COP 15 conference in Copenhagen, the Prime Minister has made a conditional commitment to reduce carbon emissions by up to 40% of the intensity of the Gross Domestic Product (GDP) by 2020 compared to 2005, reflecting the seriousness of Malaysia in order to address issues related to global climate change. The development of green cities if planned and well-controlled can help to improve the level of economic development of a country. This is not all due to urbanization positive impact, especially in meeting the quality requirements of a social life in the city, including Malaysia.

During the past four decades, the relationships between the evolution of development strategies and environmental concerns within the urban context. Urbanization increases the pressure on limited resources and available services, and threatens health, the environment and urban productivity. Despite the potential benefits of urbanization, cities of developing countries are rarely able to meet the costs that this process imposes (Zetter & Hamza, 1998 *in* Al-Moataz and Zetter, 2002). The United Nations predicts that by the year 2025, 80% of the world population will occupy cities. In the following point of view, Terry White (2000) *in* Lankford

(2011) contends that today's cities are not even close to being sustainable. White believes that the city and the surrounding countryside must conform to nature's pattern in order to become sustainable. Sustainable development can be defined as meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life without compromising the ability of future generation to meet their own needs (WCED, 1987 *in* Moffatt, 1996).

National environmental concerns first appeared in the industrialized countries and spread, albeit slowly at first, to the rest of the world. The emerging themes of environmental concerns first, to the rest of the world. The emerging themes of environmental pollution and the limits of growth demonstrated two main concerns (Al-Moataz Hassan & Zetter, 2002). First, it was increasingly recognized that high rates of industrial growth and production threatened rapidly to deplete the earth's limited stock of natural resources, the consequence being severe social and economic impacts (Tolba & El-Khouly, 1992 *in* Al-Moataz Hassan and Zetter, 2002). Second, the environmental agenda reflected the changing characteristics of environmental problem. However, the new generation of environmental problems – seemed critically to challenge the ability of the ecosystem, smog and radiation – seemed critically to challenge the ability of the ecosystem to absorb and reverse the destructive impacts.

1.1 PROBLEM STATEMENT

The main condition for real success in implementing sustainable development is to invest in city creativity and resilience. Sustainability, creativity and resilience are closely intertwined, as is clearly shown by best practices that are concentrate signs of the creativity of cities in implementing sustainable development (Girard & You, 2006 *in* Girard, 2011). The image itself of a creativities city reflects the interdependencies among sustainability, resilience and creativity and innovation, enhance the capacity to face new risks and perturbations, which is the resilience of the ecological, economic and social systems. In other words, creativity enhances sustainability because it guarantees more resilience capacity to urban systems. Governance is required to manage city resilience (Lebel et al., 2006 *in* Girard, 2011).

Putrajaya, the Federal Government Administrative Centre is a special role city that was developed in 1995. The development was guided by a visionary Master Plan endowed with the Garden City concept with vast networks of parks and open space, and in harmony with iconic built environment and community friendly. During the formation of the Multimedia Super Corridor, Putrajaya was identified to play a role as an Intelligent City and carry the e-government flagship (Putrajaya Corporation, 2011). In line with the Malaysian Government's aspiration to reduce 40% of Carbon Dioxide (CO^2) emission intensity by the year 2020 as compared with 2005 levels, this Putrajaya Green City 2025 project will become the benchmark for future urban development (Ho Chin Siong, 2012).

Toward the Malaysian Government's aspiration, regarding to Duxbury (2004) *in* Baycan (2011) has underlined the key principles in developing a city's vision and local planning processes. These key principles are as follows. First, each city and community is unique in its identity, history, development and assets; second, implementation of ideas is an art, based on knowledge and sensitivity to the community; third, city development must be rooted in authenticity, but cities should also be willing to learn from innovative ideas elsewhere (while avoiding formulaic borrowing); fourth, durable planning and governance innovation depend on strong community involvement and shared ownership of the process and outcomes; and lastly, small project sustained over time can make a difference.

Based on the above figure, these three indicators well related to the goal for Putrajaya Green City 2025 (PGC2025) in term of quantitative environmental targets are outlined in three themes. The three themes are "Low-carbon Putrajaya" for climate change mitigation, "Cooler Putrajaya" for mitigating urban heat environment and "3R Putrajaya" for recycled-based society (Ho Chin Siong, 2012). The target for 'low-carbon Putrajaya' is reducing greenhouse gas (GHG) emission intensity (per economic activity) related to energy use by 60% compared to year 2007 level. This target was set in line with the National Target of 40% reduction of CO^2 emission intensity by 2020 and also based on the future plan as stated in the Putrajaya Structure Plan (Perbadanan Putrajaya, 2009 *in* Ho Chin Siong, 2012).

Secondly, mitigating urban heat environmental and lowering peak temperature are important for not only comfortable life of Putrajaya residents and workers, but also reducing air-conditioning demand that will be effective for ‘low-carbon Putrajaya’. For ‘Cooler Putrajaya’, the target is reducing peak temperature by 2° C. Lastly ‘3R Putrajaya’, currently, most of the solid waste from Putrajaya is landfilled. However, because of limited natural resources of the earth, it is required to convert current material consumption style to more recycle-oriented, sustainable one. It also can contribute to reduce energy demand, waste related GHG emission, and carbon footprint (Ho Chin Siong, 2012).

1.2 RESEARCH OBJECTIVE

1. To identify the relationship between sustainable development and environmental agenda; and

2. To identify the importance development of Green City in Malaysia. Case studies in Putrajaya.

1.3 RESEARCH QUESTION

1. What is the relationship between sustainable development and environmental agendas and does both of it contribute to the sustainable development; and

2. Why and what is the importance development of Green City toward the sustainable development in Malaysia.

1.4 RESEARCH SIGNIFANCE

Results from this study are expected to provide insight into the following:

I. The Government and Local Authorities (LAs)

Putrajaya is a Federal Government Administrative Centre, in Malaysia. An integrated land use plan that is supported by various guidelines and plan subjects include sectors such as transport, environment, utilities, landscaping, urban design, use and consumption and so on. Therefore, Putrajaya as a precursor to the introduction of the Green City Program can be an example of the Local Authority (LA) for other cities in implementing this program.

II. Private Party and the Developer

Structure Plan is the proposed policy and land use as well as statements regarding the initiatives and programs of action that will be taken to support policies such as increasing physical environment, improved communications, traffic management, increase economic growth and socioeconomic and sustainable development. Therefore, the developers and the private sector involved with a development should have and read everything that has been planned in the structure plan for each goal to be achieved by the administration of a Local Authority that can become reality.

III. Community

In order to realize the green city programs, community participation is essential. This is because the local community is a great community that can help local authorities in managing, planning and controlling the development towards a more secure and comfortable not only at present but also in the future. With this study, it is hoped it will bring awareness to the community of their responsibility to work together in planning the development of a more green and sustainable as well as an action plan together with the local authorities and the private sector and developers so that a consensus can be reached.

1.5 RESEARCH METHODOLOGY

This section describes the methods and techniques used in the process of collecting and obtaining data comprising primary and secondary data. Determination of the research methodology is very crucial to ensure achieving the objectives of this research project and answered questions regarding this survey. There are various methods that can be performed to obtain analytical data in an investigation. Among them is through the use of interviews and observation method. These methods can be used by researchers who conducted the study as appropriate.

This study is a descriptive study that more emphasis to the elaboration of an issue of concern and interest in relation to the implementation of the Green City Program in Putrajaya. By making Putrajaya as the case study, the researchers will examine in more detail about the implementation of the Green City Program and community involvement around. In this study, run, work carried out will be divided into five main stages and each stage representing each chapter, namely:

1. Preliminary study (Chapter 1)
2. Literature Review (Chapter 2)
3. Research Methodology (Chapter 3)
4. Data Analysis and Findings (Chapter 4)
5. Discussion, Summary and Recommendations (Chapter 5)

1.6 AREA OF STUDY

Putrajaya, the Federal Government Administrative Centre is a special role city that was developed in 1995. Putrajaya was declared a Federal Territory in 2001. This 4,931 hectare city is about 65 % developed or about 3,185 hectares. The development was guided by a visionary master plan endowed with the Garden City concept with vast networks of parks and open space, and in harmony with iconic built environment and community friendly. Currently, the total population of Putrajaya is around 50,000 and 95.5 % are Bumiputera. Putrajaya has a young population with a median age of 23 years and low dependency ratio of 51 % (Perbadanan Putrajaya, 2009).

Referring to Putrajaya Corporation (2011), true to its concept as a Garden City, Putrajaya is enveloped by pristine lakes, parks, open spaces and recreational areas. A series of waterways forms the lakes. The lakes become a natural tourist attraction and host series of water-based activities including the international and national level boat races. The parks consisting several regional parks, town parks and neighbourhood parks offer unique experiences and some are exclusive to Putrajaya such as Botanical Garden, Wetland Park and Millennium Park, the lakes, parks, open spaces and recreational areas covers a total of 1,930 hectares representing 39.15 % of Putrajaya.

Putrajaya is a well-connected city, linked by highways, roads and rail to Kuala Lumpur, major towns within the Greater Kuala Lumpur/Klang Valley and the Kuala Lumpur International Airport. Internally, high standard

of roads link all the precincts. There is also a provision of park and ride and rail link as part of Putrajaya's plan to have a modal split of 70:30. Putrajaya has achieved its first stage of development, building an elegant and functional Federal Government Administrative Centre, the pride of the nation. Moving forward, the strength of Putrajaya as a Federal Government Administrative Centre with high quality infrastructure and living environment has created opportunities for further growth. Nevertheless, Putrajaya also faces uphill challenges to create multidimensional and vibrant economy, multi-ethnicity, an increase in public transport usage and improved living environment (Perbadanan Putrajaya, 2009).

Putrajaya, the pride of the nation is a well-planned city, equipped with a high standard infrastructure and facilities befit a Federal Government Administrative Centre. With this strong basic foundation, and coupled with its strategic location, superb transportation linkages, panoramic built environment and iconic buildings, Putrajaya has desirable and right strengths to trigger further growth and become a full fledge city with a strong and vibrant economy, conducive to live, work and play. Putrajaya as a Federal Government Administrative Centre is also well known both locally and internationally, giving the city a unique platform for global exposure (Perbadanan Putrajaya, 2009).

Putrajaya is a model city, planned to embrace the planning doctrine that translates the relationship of Man to His Creator, Man to Environment and Man to Man in its urban development. Putrajaya is a Garden City, where its visionary master plan has laid upon a network of parks and gardens that

creates the largest green density in a township development, where land form, vegetation, visual quality and water bodies are the essence of its spatial plan, creating quality spaces for communities that live, work and recreate in the city.

Today Putrajaya heads on being a model Green City – a city that is continuously committed towards quality of life, ensuring its built and natural environment coexist and undertaking initiatives towards reduction in carbon emission from its urban activities. It sets a roadmap in embracing sustainability and commits to a strategic framework that is holistic and integrates with its economic, physical and social development. Putrajaya 2025 vision continues the city's aspiration to be an environmentally responsible city which has been indoctrinated in its early planning and other statutory documents. Putrajaya 2025 shall addresses challenges and continues its effort to be a well-managed, vibrant, liveable and prosperous Federal Government Administrative Centre that fulfills the socioeconomic, recreational and spiritual needs of the residents, workers and visitors (Putrajaya Corporation, 2011).

The development of Putrajaya has progressed remarkably well since then. Landmark government buildings stand tall in the Government Precinct and along the ceremonial boulevard in the Core Island, portraying the sovereignty of a modern and developing country. Its world class infrastructure has the capacity to accommodate the demands of high technology operations and forward looking that is able to accommodate the

needs for green technology. Its commitment towards community development is also exemplary with high standard of community facilities and innovative neighbourhood concept in its residential precincts.

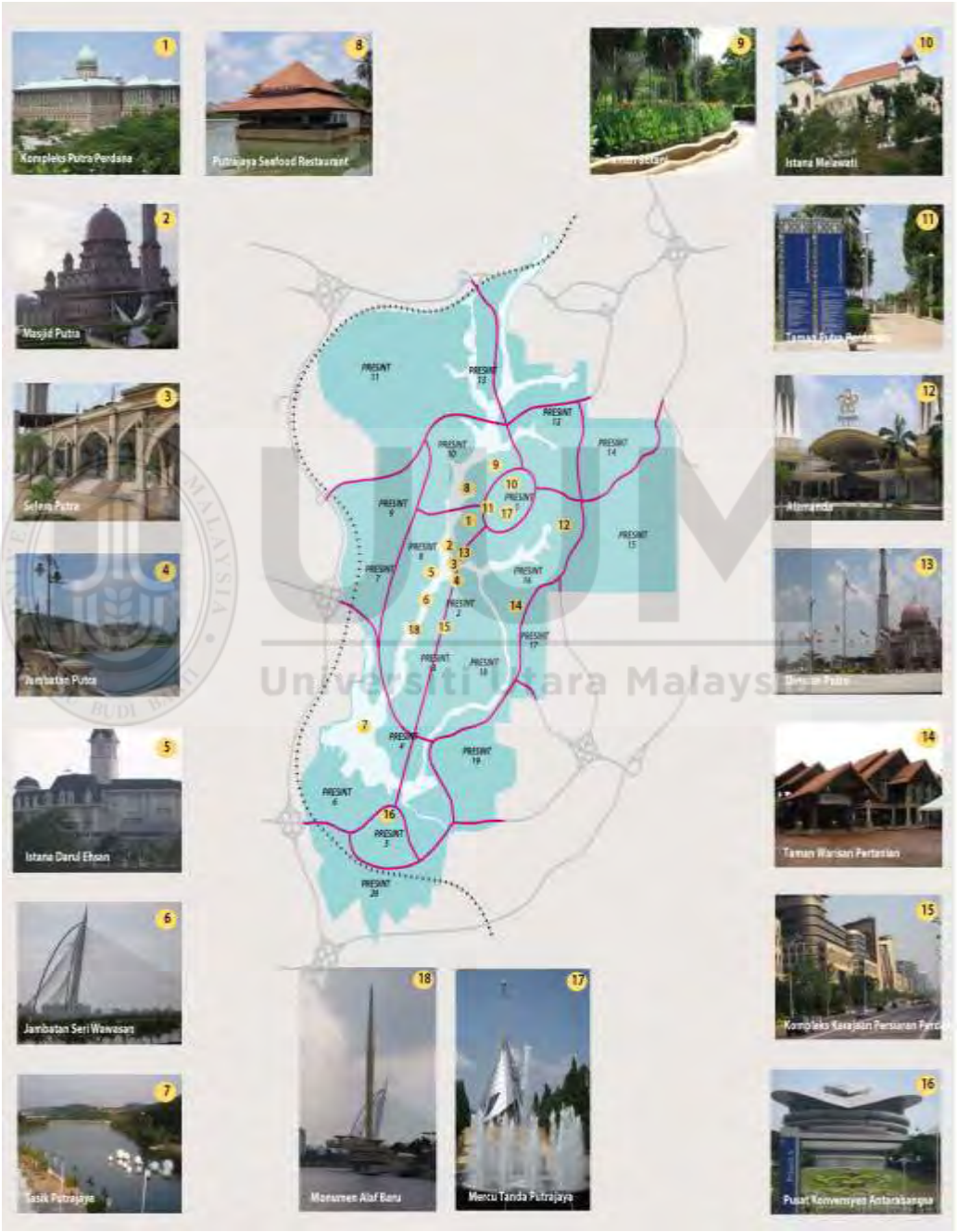

Figure 1.0
Map of Putrajaya
Source: Perbadanan Putrajaya, 2009

1.7 CONCLUSION

As a conclusion, towards achieving a Green City in Putrajaya based on Putrajaya Green City 2025: Baseline and Preliminary Study (Revised Edition, November 2012), 12 actions have been introduced. The goal for Putrajaya Green City (PGC2025) in term of quantitative environmental targets is outlined in three themes. The three themes are “Low-carbon Putrajaya” for climate change mitigation, “Cooler Putrajaya” for mitigating urban heat environment and “3R Putrajaya” for recycled-based society.

CHAPTER TWO

LITERATURE RIVIEW

2.0 INTRODUCTION

Over the past decade in particular, many countries in the world are involved in the development. The adoption of The Kyoto Protocol and Agenda 21 created in 18 years ago are important historic moves towards sustainability Sustainable development has become an important aspect of development. Nowadays, as a result of this development, studies about the aspects of sustainable development are increasing. Sustainable development is popularly described as "a development that meets the needs of the present without compromising the ability of the future generations to meet their own needs" (WCED, 1987 *in* Moffat, 1996). Malaysia is actively engaged in international pacts concerning sustainable development efforts.

2.1 DEFINITION AND CONCEPTS

The concept of sustainable development arose in the mind of the world community in the 1970s. When addressing current and future social, economic, and environmental challenges that are facing the planet, there is now an established consensus that these challenges are interlinked and must be addressed through an integrated approach. The environment, along with social and economic factors, must play an important role when aiming to achieve truly sustainable development on a global scale. Only through integration of the three dimensions will it be possible to achieve the transformative change required to secure long-term human and environmental well-being.

2.1.1 SUSTAINABLE DEVELOPMENT

Almost 28 years ago, in presenting the report to the World Commission on Environment Development, The Brundtland Commission Report defined sustainable development in a broad sense which is often quoted by academic scholars and planners of sustainable development. The definition in the Report was “Sustainable development is the development which meets the needs of the present without compromising the ability of the future generations to meet their own needs” (WCED, 1987 *in* Moffat, 1996 p.27). This report of the United Nation's Brundtland Commission in 1987 marked

the beginning of the sustainable development concept that has generated a lot of literature and commentary on the issue.

By referring to Dovers (2009), he also stated that the sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs, but he added this concept with two main keys It contains within it two key concepts:

1. The concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and

2. The idea of limitation imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

Sustainable development is not a one way traffic; it involves not only economic development, but also social and environmental development. We have to bear in mind that while we are developing our country to meet the needs of people, we must not destroy the environment and ecological balance. We have already caused a lot of harm to the environment which is nowadays known as ‘global warming’ and ‘climate change’ and we are suffering from its adverse effects. So, sustainable development ensures a developed world with secured and healthy environment for all: human beings, animals and plants (Muhammad Abdul Jalil, 2010). The sustainable development concept

brings together the economic, societal and environmental consideration when articulating development.

2.1.2 ENVIRONMENTAL AGENDAS

The environmental movement might be said to have begun centuries ago as a response to industrialization. The environmental movement gained new momentum in 1962 with the publication of Rachel Carson's book "The Silent Spring", which warned about the agricultural use of synthetic chemical pesticides. As universal concern about the healthy and sustainable use of the planet and its resources continued to grow, the UN, in 1972, convened the United Nations Conference on the Human Environment, in Stockholm.

The Stockholm Conference, organized by Canada's Maurice Strong was the first global United Nations conference on the environment for state officials. It was a landmark event, and its final Declaration contains 19 principles that represent an environmental manifesto during that time. In addressing the need "to inspire and guide the peoples of the world in the preservation and enhancement of the human environment", it laid the groundwork for the new environmental agenda of the United Nations system. The United Nations General Assembly, in December 1972, established the United Nations Environment Program (UNEP), which leads the efforts of the United Nations family on behalf of the global environment. Its current priorities are environmental aspects of disasters and conflicts, ecosystem

management, environmental governance, harmful substances, resource efficiency, and climate change.

In 1983, the Secretary-General of the United Nations invited Dr. Gro Harlem Brundtland, a medical doctor, master of public health and former Prime Minister of Norway, to establish and chair a World Commission on Environment and Development. Dr. Brundtland was a natural choice for this timely role, as her vision of health had long extended beyond the confines of the medical world into environmental issues and human development. In April 1987, the Brundtland Commission, as it came to be known, published its groundbreaking report, "Our Common Future" — which brought the concept of sustainable development into the public discourse.

> "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs."
>
> "A world in which poverty and inequity are endemic will always be prone to ecological and other crises. Sustainable development requires that societies meet human needs both by increasing productive potential and by ensuring equitable opportunities for all."
>
> "Many of us live beyond the world's ecological means, for instance in our patterns of energy use. At a minimum, sustainable development must not endanger the natural systems that support life on Earth: the atmosphere, the waters, the soils, and the living beings."
>
> "In essence, sustainable development is a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development; and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations."
>
> — from the Brundtland Report,"Our Common Future"

The wide-ranging recommendations made by the Commission led directly to the holding of the United Nations Conference on Environment and Development, which placed the issue squarely on the public agenda in a way it had never been before. Meeting in Rio de Janeiro, in 1992, the "Earth Summit", as it came to be known, adopted its "Agenda 21", a blueprint for the protection of our planet and its sustainable development. Agenda 21, represented the culmination of two decades of focused attention, which began with the United Nations Conference on the Human Environment, held in Stockholm in 1972. Based on its conclusions, the UNEP was created, to become the world's leading environmental agency. By 1992, the link between environment and development, and the imperative need for sustainable development was seen and recognized worldwide.

In Agenda 21, governments outlined a detailed blueprint for action that could move the world away from its present unsustainable model of economic growth towards activities that will protect and renew the environmental resources on which growth and development depend. Areas for action included: protecting the atmosphere; combating deforestation, soil loss and desertification; preventing air and water pollution; halting the depletion of fish stocks; and promoting the safe management of toxic wastes. But Agenda 21 went beyond these purely environmental issues to address patterns of development which cause stress to the environment. These included: poverty and external debt in developing countries; unsustainable patterns of production and consumption; demographic stress; and the structure of the international economy. The action program also

recommended ways to strengthen the part played by major groups such as women, trade unions, farmers, children and young people, indigenous peoples, the scientific community, local authorities, business, industry and NGOs — in achieving sustainable development. To ensure full support for the goals of Agenda 21, the General Assembly in 1992 established the Commission on Sustainable Development, as a functional commission of the Economic and Social Council.

The Earth Summit also led to the adoption of the UN Convention on Biological Diversity (1992) and the UN Convention to Combat Desertification in Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (1994). In 1994, a Global Conference on the Sustainable Development of Small Island Developing States, held in Barbados, adopted a Program of Action that set forth policies, actions and measures at all levels to promote sustainable development for these states. In what was called the "Earth Summit + 5", the General Assembly held a special session in 1997 to review and appraise the implementation of Agenda 21, and make recommendations for its further fulfillment. The session's final document recommended the adoption of legally binding targets to reduce emission of greenhouse gases leading to climate change; moving more forcefully towards sustainable patterns of energy production, distribution and use; and focusing on poverty eradication as a prerequisite for sustainable development.

The principles of sustainable development have been implicit in many UN conferences, including: the Second UN Conference on Human Settlements (Istanbul, 1996); the Special Session of the General Assembly on Small Island Developing States (New York, 1999); the Millennium Summit (New York, 2000) and its Millennium Development Goals (Goal 7 seeks to "Ensure Environmental Sustainability") and the 2005 World Summit. In 1988, UNEP and the World Meteorological Organization (WMO) came together to create the Intergovernmental Panel on Climate Change (IPCC), which has become the pre-eminent global source for scientific information relating to climate change. The main international instrument on this subject, the United Nations Framework Convetion on Climate Change (UNFCCC) was adopted in 1992. And its Kyoto Protocool, which sets binding targets for 37 industrialized countries and the European community for reducing greenhouse gas emissions, was adopted in 1997.

In 2002, the World Summit on Sustainable Development was held in Johannesburg, South Africa, from 26 August to 4 September 2002, to take stock of achievements, challenges and new issues arising since the 1992 Earth Summit. It was an "implementation" Summit, designed to turn the goals, promises and commitments of Agenda 21 into concrete, tangible actions. Member states agreed to the Johannesburg Declaration on Sustainable Development and a Plan of Implementation detailing the priorities for action. The Division for Sustainable Development of the UN Department of Economic and Social Affairs – which provides the secretariat for the Commission on Sustainable Development, and was already engaging in

monitoring implementation of Agenda 21 and the 1994 Barbados Program of Action for the Sustainable Development of Small Island Developing States – began doing the same with regard to the Johannesburg Plan of Implementation.

In January 2005, the international community met at Mauritius to conduct a 10-year United Nations review of the Barbados Program, approving a wide-ranging set of specific recommendations for its further implementation. The Mauritius Strategy addresses such issues as climate change and rising sea levels; natural and environmental disasters; management of wastes; coastal, marine, freshwater, land, energy, tourism and biodiversity resources; transportation and communication; science and technology; globalization and trade liberalization; sustainable production and consumption, capacity development, and education for sustainable development; health; culture; knowledge management and information for decision-making. At the Earth Summit, it was agreed that most financing for Agenda 21 would come from within each country's public and private sectors. However, new and additional external funds were deemed necessary to support developing countries' efforts to implement sustainable development practices and protect the global environment.

Addressing this need, the Global Environment Facility (GEF) was established in 1991 to help developing countries fund projects that protect the global environment and promote sustainable livelihoods in local communities. It has provided $8.8 billion in grants and generated over $38.7

billion in cofinancing from recipient governments, international development agencies, private industry and NGOs, to support more than 2,400 projects in more than 165 developing countries and economies in transition. It has also made more than 10,000 small grants directly to nongovernmental and community organizations.

GEF project principally carried out by UNDP, UNEP, and the World Bank conserve and make sustainable use of biological diversity, address global climate change, reverse the degradation of international waters, phase out substances that deplete the ozone layer, combat land degradation and drought, and reduce and eliminate the production and use of certain persistent organic pollutants. To help advance the cause of sustainable development in a continuous fashion, the General Assembly also declared the period 2005-2014 as the United Nations Decade of Education for Sustainable Development. The Decade, for which the United Nations Educational, Scientific and Cultural Organization (UNESCO) is the lead agency, aims to help people to develop the attitudes, skills and knowledge to make informed decisions for the benefit of themselves and others, now and in the future, and to act upon those decisions.

The list of UN bodies active in support of the environment and sustainable development includes the World Bank, the United Nations Development Programme (UNDP), the International Maritime Organization (IMO), the United Nations Industrial Development Organization (UNIDO), the Food and Agriculture Organization of the United Nations (FAO), the UN

Human Settlements Programme (UN-HABITAT), the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the International Atomic Energy Agency (IAEA). The UN Global Compact engages the international business community in the observance of environmental principles, and the Global Environment Facility (GEF), a World Bank-UNDP-UNEP initiative, helps to fund it all.

In view of the crucial importance of the environmental perspective and the principle of sustainability, the General Assembly has declared a number of observances to catalyze positive action worldwide. Among those currently in effect are the United Nations Decade of Education for Sustainable Development (2015-2014), and the International Decade for Action, "Water for Life", which began on 22 March 2005. In addition, the world community will observe the International Year of Natural Fibres in 2009, the International Year of Biodiversity in 2010, and the International Year of Forests in 2011. Annual environment-related observance declared by the Assembly also include World Water Day (22 March), the International Day for Biological Diversity (22 May), World Environment Day (5 June), World Day to Combat Desertification and Drought (17 June), International Day for the Preservation of the Ozone Layer (16 September), International Day for Preventing the Exploitation of the Environment in War and Armed Conflict (6 November), and International Mountain Day (11 December).

The passage above cited and modified from http://www.un.org/en/globalissues/environment.

2.1.3 GREEN CITY – GOING GREEN

Cities are the primary source of growth and innovation and are also where the world's population is increasingly concentrated. They are also the leading consumers of energy and the primary source of greenhouse gasses. With cities throughout the world continuing to grow and as many as 300 million people migrating to cities in both China and India in the coming decades, how metropolitan areas manage growth has profound economic and social implications (Randolph, 2012).

According to Putrajaya: Draft Structure Plan 2025 (p. 2.1), Green City means 'a city that is continuously committed towards quality of life, ensuring its built and natural environment co-exist and undertaking initiatives towards reduction in carbon emission from its urban activities. It sets a roadmap in embracing sustainability and commits to a strategic framework that is holistic and integrates with its economic, physical and social development. By referring to the interpretation of the above, it is clear that Green City status to be achieved in Putrajaya is not limited to physical greenish only. It also covers three main objectives as follows:

i. Minimize negative environmental impact around and use resources;
ii. Promote human relations with nature; and
iii. Reduce carbon emissions from various human activities.

2.1.3.1 INITIATIVES TOWARD LOW CARBON-GREEN CITY

A development concept adopted in the Putrajaya Master Plan in 1995 based 'Garden City' of the principle of sustainable development while promoting human interaction with the natural environment has been provides a solid foundation as a prerequisite to move towards the goal of Putrajaya a low carbon green city (Perbadanan Putrajaya, 2012).

According to Perbadanan Putrajaya (2012), matters that require attention now is strengthen the existing runway with developing it further as scopes initiative the long-term. With the focus of the initiative is a clear scope, it will help make an assessment of the achievement over time compared with the target set green city. Towards this end, seven key focus scope has been identified namely:

1. Urban planning and building;
2. Integrating the natural environment in the built environment;
3. The use of energy;
4. The use of water;
5. Transport and mobility;
6. Management of solid waste; and
7. Administration and urban management.

2.1.4 NATIONAL GREEN TECHNOLOGY POLICY

The National Green Technology Policy was successfully launched by the Prime Minister YAB Dato' Sri Mohd Najib Tun Abdul Razak on 24 July 2009. The National Green Technology Policy is built on four pillars – Energy, Environment, Economy and Social. Green Technology is aimed to be the key driver in accelerating the national economy and promoting sustainable development in Malaysia (Kementerian Tenaga, Teknologi Hijau Dan Air, Malaysia, 2009).

The Ministry of Energy, Green Technology and Water Malaysia (KeTTHA) is responsible for the planning and formulation of policies for energy, green technology and water sectors as well as to facilitate and to regulate the growth of these sectors. The nationwide goal of the policy is to provide direction and motivation for Malaysians to continuously enjoy good quality living and a healthy environment. To realize this goal, the Prime Minister has specified a task for GreenTech Malaysia - to spearhead the implementation of projects and activities pertaining the four pillars.

Below are GreenTech Malaysia's perspective alignments towards the goals of the National Green Technology Policy:

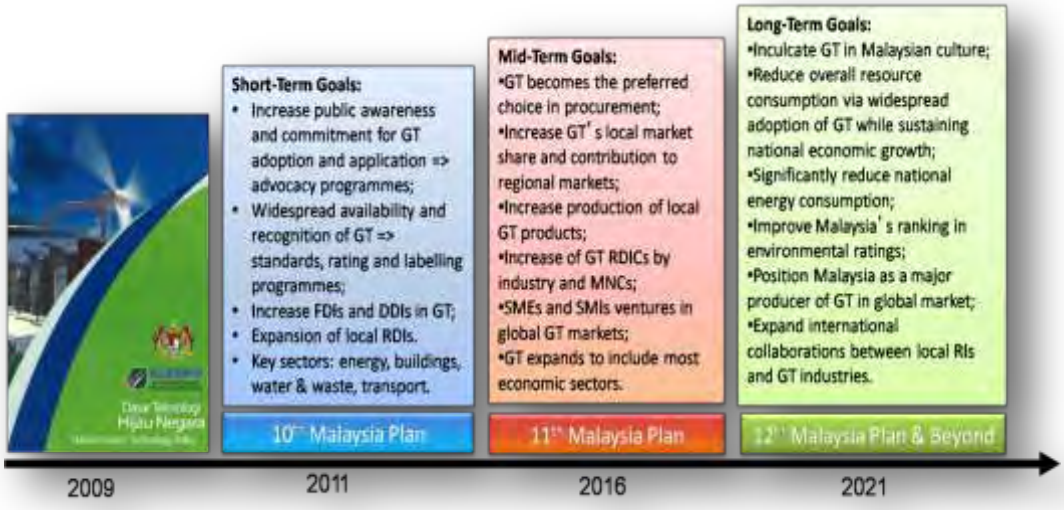

Figure 2.0
GreenTech Malaysia's Perspective Alignments
Source: Kementerian Tenaga, Teknologi Hijau Dan Air, Malaysia, 2009

2.1.5 QUALITY OF LIFE (QL)

The clarification of the concept is the outcome of a gradual process of debate, progressively confronted with its operationalization. In 1973, Terhurne defined QL as subjective satisfaction (Veenhoven, 2000 *in* Maria, 2010); in 1975, McCall defined QL as a necessary condition for happiness (McCall, 1975 *in* Maria, 2010). In 1985, Emerson defines QL: As the satisfaction of an individual's values, goals and needs through the actualisation of their abilities or lifestyle (Emerson, 1985, p. 282, quoted by Felce and Perry, 1995, p. 58). In 1986, Landesman (quoted by Felce and Perry, 1995) considers that QL ''is the sum of a range of objectively measurable life conditions experienced by an individual'' distinguished from the satisfaction which is understood as ''subjective responses to such conditions'' (Felce and Perry, 1995, p. 54).

After several meetings in Geneva during the years of 1991 and 1992, in 1993, the World Health Organization provided its own definition of QL: "Quality of life is defined as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad-ranging concept incorporating in a complex way the person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationship to salient features of the environment" (WHOQOL Group, 1995, p. 1 *in* Maria, 2010).

Hence QL of an individual or of a population subgroup results from the comparison of their position with the position of the rest of the population (Felce and Perry, 1995). The objective measures of living conditions should not be forgotten given the risk of not taking into account the entire population, namely the less favored and more vulnerable groups (Felce and Perry, 1995).

2.2 THE CONNECTION BETWEEN ENVIRONMENTAL AGENDAS AND SUSTAINABLE DEVELOPMENT

The concern for the environment and the development of environmental movement had developed since the 1970s in the USA. In fact, Malaysia is one of the earliest nations in the world to have adopted a serious concern towards the environment by enacting the Environment Quality Act way back in 1974 (Yeong Liang Sim Frederik Josep Putuhena, 2015).

Over the centuries, the world has become more and more urbanized. By 2050, about 70 % of the world's population is expected to live in urban areas and over 60 % of the land projected to become urban by 2030 is yet to be built (Cities for a sustainable future, 2014). At the beginning of the 19th century, only 2 % of the world's population lived in cities, whereas during the first decade of the 21st century, this number reached the 50 % mark. Urban centres have thus become the most dominant habitat of humankind and the trend continues. As stated by UN DESA's Under Secretary General, Mr. Wu Hongbo, 95 % of urban expansion will take place in the developing world. Clearly, such massive changes will pose social, economic and environmental challenges, while also creating tremendous opportunities.

If done right, urbanization can help deliver a sustainable future. With the world urban population estimated to increase from 3.5 billion today to 6.2 billion in 2050, urbanization poses both a challenge and an opportunity for sustainable development. Urban areas are faced with problems of

unsustainable geographical expansion patterns; ineffective urban planning, governance and financing systems; inefficient resource use; poverty, inequalities and slums; as well as inadequate delivery of basic services (Cities for a sustainable future, 2014). Urban centres account for 70 % of the world gross domestic product (GDP), i.e. 55 % in low-income countries, 73 % in middle-income countries, and 85 % in high-income economies.

Malaysia has been a successful developing country and is forging ahead to become a developed nation in its own mould. In order to be more successful, our nation has to be managed effectively and its weaknesses and shortcomings have to be overcome. The process of urbanization can thus create an enabling environment for transforming production capacities, income levels and living standards, especially in developing countries. However, this requires a shift in mind-set of decision makers, away from viewing urbanization as a problem, towards viewing urbanization as an opportunity to promote sustainable development.

In fact that, the reconciliation of environmental, social and economic demands – the three pillars of sustainability – (figure 2.1) was featured earlier beginning with the Third Malaysia Plan, 1976 – 1980 (3MP). The 3MP stated that ‘it is vital that the objectives of development and environment conservation be kept in balance, so that the benefits of development are not negated by the costs of environmental damage’. Crucial element of sustainability such as equitable distribution, sustainable development and

viable programmes were incorporated (Raja Zaharaton Raja Zainal Abidin *in* .Abdul Samad Hadi, Adnan Hezri, A. Aldrie Amir & Sarah Aziz, 2013).

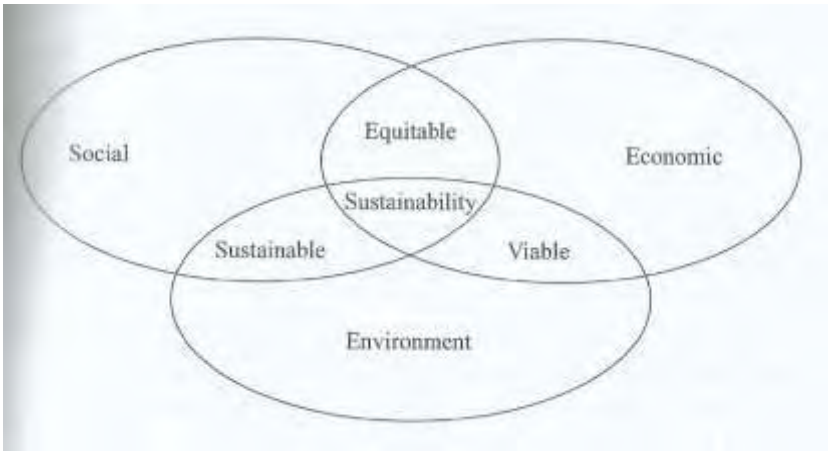

Figure 2.1
The three pillar of sustainability
Source: Facets of Sustainability, 2013.

The environmental movement might be said to have begun centuries ago as a response to industrialization. Rio+20 were an important stocktaking of the world's progress towards achieving sustainable development. Certainly one of its key outcomes was the call to develop sustainable development goals (SDGs) with the aim to bring the world further along the path of sustainable development (UNEP, 2013).

Countries declared that the SDGs should be transformational and address the multiple and intertwined challenges of ensuring environmental sustainability, eradicating extreme poverty, and achieving economic and social well-being. They also affirmed that these goals should be universally applicable to all countries while taking into account different national realities, capacities and levels of development. While taking a forward-

looking approach to such goals, they recommended looking back at the Millennium Development Goals (MDGs) and other goals and targets to learn from experience (UNEP, 2013).

Sustainable development is a form of development that aims to meet the needs of the present without compromising the interests of future generations. The development concept takes into account aspects of social justice, basic human needs, public health and public awareness of the environment in terms of its relationship with space and time (Kamarudin Ngah and Jamaludin Mustaffa, 2013). According to Sham Sani, (1993) *in* Kamarudin Ngah and Jamaludin Mustaffa (2013), the basic elements that make up the concept of sustainable development is the environment and development. Both of these elements are absolutely inseparable because development requires resources in the environment and environmental needs attention from development. According to her, the environment should be kept as it is part of the ecosystem of human life. Environmental destruction means the destruction of human life itself. Development should also be monitored for their impact on humans and the environments are difficult to predict.

The concept of sustainable urban development requires a mission set for the welfare of the community life in the city in particular. In the urban context, the concept of sustainable development and the concept of quality of life were found to have goals, and the impact of similar interest. In this

century, urban development in Malaysia faces a huge challenge to meet these demands.

2.3 THE PRINCIPLE OF SUSTAINABLE DEVELOPMENT

Many governments and individuals have pondered what sustainable development means beyond a simple one-sentence definition. The *Rio Declaration on Environment and Development* fleshes out the definition by listing 17 principles of sustainability.

1. People are entitled to a healthy and productive life in harmony with nature.

2. Development today must not undermine the development and environment needs of present and future generations.

3. Nations have the sovereign right to exploit their own resources, but without causing environmental damage beyond their borders.

4. Nations shall develop international laws to provide compensation for damage that activities under their control cause to areas beyond their borders.

5. Nations shall use the precautionary approach to protect the environment. Where there are threats of serious or irreversible damage, scientific uncertainty shall not be used to postpone cost-effective measures to prevent environmental degradation.

6. In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process, and cannot be considered in isolation from it. Eradicating poverty and reducing disparities in living standards in different parts of the world are essential to achieve sustainable development and meet the needs of the majority of people.

7. Nations shall cooperate to conserve, protect and restore the health and integrity of the Earth's ecosystem. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command.

8. Nations should reduce and eliminate unsustainable patterns of production and consumption, and promote appropriate demographic policies.

9. Environmental issues are best handled with the participation of all concerned citizens. Nations shall facilitate and encourage public awareness and participation by making environmental information widely available.

10. Nations shall enact effective environmental laws, and develop national law regarding liability for the victims of pollution and other environmental damage. Where they have authority, nations shall assess the environmental impact of proposed activities that are likely to have a significant adverse impact.

11. Nations should cooperate to promote an open international economic system that will lead to economic growth and sustainable development in all countries. Environmental policies should not be used as an unjustifiable means of restricting international trade.

12. The polluter should, in principle, bear the cost of pollution.

13. Nations shall warn one another of natural disasters or activities that may have harmful Trans-boundary impacts.

14. Sustainable development requires better scientific understanding of the problems. Nations should share knowledge and innovative technologies to achieve the goal of sustainability.

15. The full participation of women is essential to achieve sustainable development. The creativity, ideals and courage of youth and the knowledge of indigenous people are needed too. Nations should recognize and support the identity, culture and interests of indigenous people.

16. Warfare is inherently destructive of sustainable development, and Nations shall respect international laws protecting the environment in times of armed conflict, and shall cooperate in their further establishment.

17. Peace, development and environmental protection are interdependent and indivisible.

Adapted from "Introduction" in McKeown, Rosalyn. *Education for Sustainable Development Toolkit,* Version 2, Centre for Geography and Environmental Education, University of Tennessee, July 2002.

2.4 MODELS FOR SUSTAINABLE DEVELOPMENT

Models help us understanding the concepts of Sustainability better. Achieving sustainable development thus, requires more effective, open, and productive association among the people themselves. Models help us gather, share, and analyse information; they help coordinating work; and educate and train professionals, policymakers, and the public in general. The following are some of the constructive models for understanding sustainable development.

2.4.1 THREE PILLAR BASIC MODEL

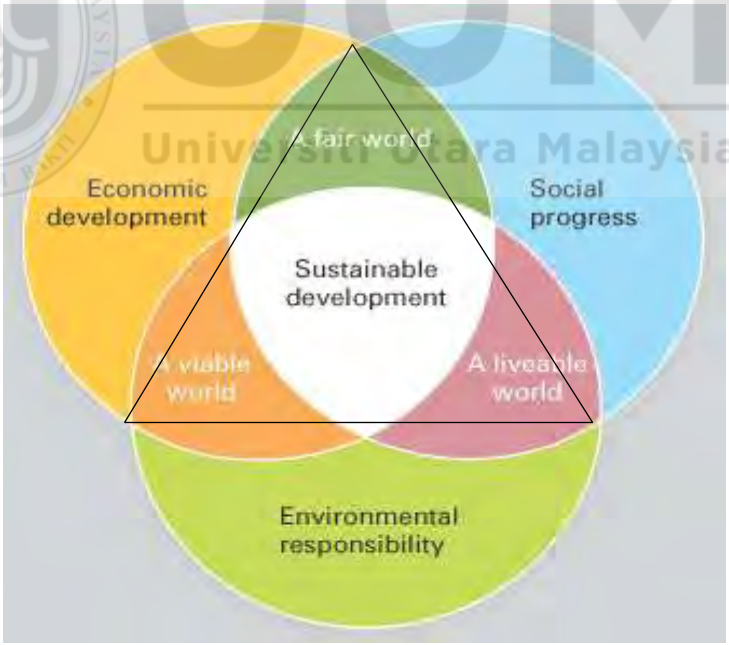

Figure 2.2
Three Pillar Basic Model
Source: Centre for Environment Education, 2007.

We need to develop the ability to make a choice which respects the relationship between the three "Es" – economy, ecology and equality. If all the three "e's" are incorporated in the national goals of countries then it would be possible to develop a sustainable society. This is one of the most well-known models created using the three dimensions -Economy, Environment and Society.

The diagram above shows three interlocking circles with the triangle of environmental (conservation), economic (growth), and social (equity) dimensions. Sustainable Development is modelled on these three pillars. This model is called 'three pillars' or 'three circles model'. It is based considering the society, but does not explicitly take into account 'human quality of life'(Centre for Environment Education, 2007).

2.4.2 THE EGG OF SUSTAINABILITY

The 'Egg of Sustainability' model was designed in 1994 by the International Union for the Conservation of Nature, IUCN (cf. Guijt & Moiseev 2001 *in* Centre for Environment Education, 2007). Thus according to this model:

sustainable development = human well-being + ecosystem well-being

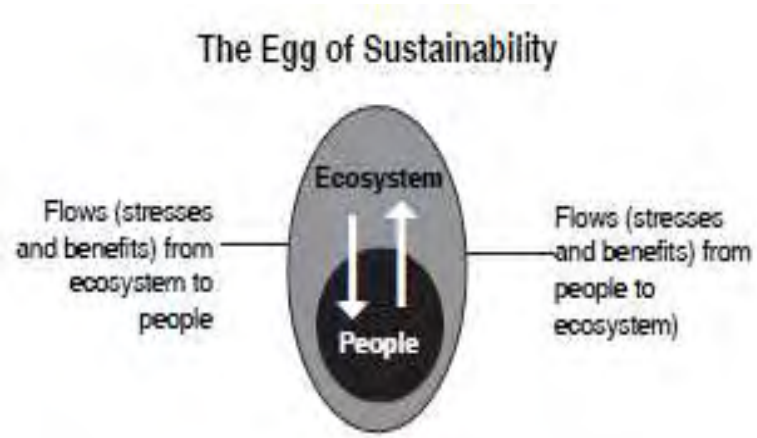

Figure 2.3
The Egg of Sustainability
Source: Centre for Environment Education, 2007.

It illustrates the relationship between people and ecosystem as one circle inside another, like the yolk of an egg. This implies that people are within the ecosystem, and that ultimately one is entirely dependent upon the other. Just as an egg is good only if both the white and yolk are good, so a society is well and sustainable only if both, people and the eco-system, are well (Centre for Environment Education, 2007).

Social and economical development can only take place if the environment offers the necessary resources: raw materials, space for new production sites and jobs, constitutional qualities (recreation, health etc.). The ecosystem is therefore to be regarded as a super coordinated system to the other dimensions of the triangle or prism models: social, economical, and institutional. These latter can only prosper if they adapt themselves to the limits of environmental carrying capacity (Centre for Environment Education, 2007).

2.4.3 PRISM OF SUSTAINABILITY

This model was developed by the German Wuppertal Institute and defines sustainable development with the help of four components - economy, environment, society and institution. In this model the inter-linkages such as care, access, democracy and eco-efficiency need to be looked at closely as they show the relation between the dimensions which could translate and influence policy. In each dimension of the prism, there are imperatives (as norms for action). Indicators are used to measure how far one has actually come in comparison to the overall vision of sustainable development (Centre for Environment Education, 2007). This is described in the following diagram below:

Figure 2.4
Prism of Sustainability
Source: Centre for Environment Education, 2007.

Kain (2000, p. 25) *in* Centre for Environment Education (2007) had however criticized this prism, arguing that 'the economic dimension tends to include assets emanating from all four dimensions, thus, adding confusion to the description and analysis'.

2.4.4 THE AMEOBA MODEL

The Amoeba Approach is a model used to visually assess a system's condition relative to an optimal condition.The model is circular with the various indicators positioned around the outside. Lines radiate from the centre to the indicators, on a continuum from unsustainable (in the center) to sustainable (the outside of the circle). A circle would indicate the optimum conditions. This type of model allows simultaneous assessment of different indicators, and easy comparison between components of the system. "The Amoeba Model" is a powerful technique for accelerating the innovation process and training to be far more effective in achieving sustainable development (Centre for Environment Education, 2007).

2.5 SUSTAINABLE DEVELOPMENT IN MALAYSIA: NATIONAL PLANS, LEGISLATION AND POLICIES

Sustainable development ensures the well-being of humans by integrating social equity, economic viability, and environment conservation and protection (Chua Fuh Yiing, Naziaty Mohd Yaacob & Hazreena Hussien, 2013). Most interpretation of sustainable development work within the Brundtland formula but vary in relation to the emphasis placed on each of this three components of sustainable development namely economy, environment and society (Ross, 2009 *in* Noranida Mokthsim & Khairulmaini Osman Salleh, 2014).

By referring to Noranida Mokthsim and Khairulmaini Osman Salleh (2014), sustainable development that is locally relevant and culturally appropriate could include several common goals or themes. The International Implementation Scheme for the United Nations Decade of Education for Sustainable Development (UNDESD) (UNESCO 2005) identified key areas of the concept as:

- Society: an understanding of social institutions and their role in change and development, as well as the democratic and participatory systems which give opportunity for the expression of opinion, the selection of government, the forging of consensus and the resolution of differences.

- Environment: awareness of the resources and fragility of the physical environment and the effects on it of human activity and decisions, with a commitment of factoring environmental concerns into social and economic policy development.

- Economy: sensitivity to the limits and potential economic growth and their impact on society and on environment, with a commitment to assess personal and societal levels of consumption out of the concern for the environment and for social justice.

According to Agyeman (2003), Pinfield (1997), Redclift (1987) and Campbell (1996) *in* Chua Fuh Yiing, et.al (2013), sustainable development addresses three vital areas that is people living today are entitled to justice and equal rights, environmental degeneration must be eliminated, and future generation must not be impoverished as a result of current actions.

Sustainable development was adopted in Malaysia during the 1992 non-governmental organization (NGO) Forum for RioC10 Malaysia – Chapter of 40 of Agenda 21. Planning by Malaysia constitutes a National Plan where sustainable development was outlined as one of the goals. Table 2.0 shows that accessibility was introduced much later in the Tenth Malaysian Plan where it refers to the quality of life. In the Ninth Malaysian Plan accessibility was mentioned only in general regarding infrastructure. The Town and Country Planning Act included sustainable development as shown in Table 2.1 (Chua Fuh Yiing, et.al, 2013).

Malaysia Plan	Key Emphasis
Seventh Malaysian Plan (1996 – 2000)	Sustainable development
Eighth Malaysian Plan (2001 – 2005)	Sustainable development of energy resources and renewable
Ninth Malaysian Plan (2006 – 2010)	Sustainable development covering social, economic and environmental aspects. Improving accessibility to and within the country, enhancing transportation links and communication services and internet at entry points.
Tenth Malaysian Plan (2010 – 2015)	Improving the standard and sustainability of quality of life through better access to healthcare, public transport, electricity and water. AFFIRM framework (Awareness, Faculty, Finance, Infrastructure, Research and Marketing) was established to promote the implementation of sustainable development in

	the construction industry. Green building as part of sustainable development is government's consideration to achieve a better future for next generation.

Table 2.0
Malaysia's National Five Year Development Plans showing sustainable development concepts
Source: Chua Fuh Yiing, et.al (2013).

Legal Regulation	Remarks
Town and Country Planning Act 1976 (Act 172)	Section 2A (2) National Physical Planning Council. The functions are to promote the framework of the national policy, town and country planning as an effective and efficient instrument for the improvement of the physical environment and towards achieving the sustainable development. Section 8 (3) The statement is to formulate the policy and general proposals of the State Authority, respecting the development and use of land, including improvement measures of the physical living environment, communications, traffic management, socio-economic well-being and the promotion of economic growth , and for

	facilitating sustainable development. (4) In formulating the policy and general proposals under paragraph (3) (a), the State Director shall secure that the policy and general proposals are justified under the results of his survey under section 7 and by any other information that he may obtain, and shall have regards to current policies respecting the social and economic planning and development and the environmental protection of the State and the nation.

Table 2.1
Planning legislation that referred to sustainable development in Malaysia
Source: Chua Fuh Yiing, et.al (2013).

National Policy	Key Emphasis
National Policy on the Environment (2002)	Economic, social and cultural progress through environmentally sustainable development.
National	Sustainable development

Green Technology (2009)	Energy: seek to attain energy independence and promote efficient utilization. Environment: conserve and minimize the impact on the environment. Economy: enhance the national economic development through the use of technology. Social: improve the quality of life for all.

Table 2.2
National policy on the environment and technology in Malaysia
Source: Chua Fuh Yiing, et.al (2013).

Table 2.2 shows that the national policy in green environment and technology was created and included the agenda to improve the quality of life for all (Chua Fuh Yiing, et.al, 2013). The incorporation of the main principles of the concept of sustainability in the development plan was examined in this section. It is observed that in the preparation of the development plan, the growth target is premised on an economic model with realistic framework and also focus on societal welfare and human economy (Raja Zaharaton Raja Zainal Abidin *in* .Abdul Samad Hadi, et. al, 2013).

2.6 CONCLUSION

Sustainable development is a journey, a hard, adventure journey upon which many of the future prospects of humanity and its planet depends. No single country can yet claim a comprehensive, credible commitment to sustainable development (Dovers, 2009). Development has become a universal belief that involves the whole of mankind. Development remains a humanitarian agenda in the 21st century. The concept of development for all human beings and all the earth is a challenge that is not easy.

We accept globalization, but the globalization of people-friendly or human friendly. The wave of sustainable development will wash over us, redefining our future. Our journey toward a sustainable future offers hope that solutions can be found and many are ready now. Achieving sustainability requires us to consider new policies, devise new programs and consider new technologies. To achieve sustainability, we must minister to the needs of our growing populations, have the fortitude to implement incremental changes and monitor and adjust our approaches.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 INTRODUCTION

The methodology is that there are rules in order to conduct research. Determination of the research methodology is very crucial to ensure achieving the objectives of this research project and answered questions regarding this survey. There are various methods that can be performed to obtain analytical data in an investigation. Among them is through the use of interviews and observation method. These methods can be used by researchers who conducted the study as appropriate. This study used a qualitative research design to provide a more comprehensive picture of each aspect of the study.

3.1 METHOD OF STUDY

This study used an exploratory study design (exploration). Exploratory research is a type of research conducted for a problem that has not been clearly defined. Exploratory research helps determine the best research design, data collection method and selection of subjects. It should draw

definitive conclusions only with extreme caution. Given its fundamental nature, exploratory research often concludes that a perceived problem does not exist (N.K. Mandal, 2013).

The method of collecting data is in the form of qualitative methods. A qualitative approach involves data collection narrative seeks to explain, predict and understand the phenomenon of interest, while data analysis involves only one encoding data and an oral synthesis. Qualitative methods produce information only for specific case studies and general conclusions are purely hypothetical because it does not involve analysis of statistical data (Fauzi Hussin, Jamal Ali & Mohd Saifoul Zamzuri Noor, 2014). Qualitative research methods are valuable in providing rich descriptions of complex phenomena; tracking unique or unexpected events, illuminating the experience and interpretation of events by actors with widely differing stakes and roles; giving voice to those whose views are rarely heard; conducting initial explorations to develop theories; and to generate and test hypotheses; and moving toward explanation (N.K. Mandal, 2013).

Primary data is the original data collected specifically to answer the research question (Sabitha Marican, 2006). Sources of information for the study of primary data is information collected usually by the researchers as observations and interviews. While secondary data is to use data collected by other researchers (Sabitha Marican, 2006). Among the examples of sources of information for the study of secondary data is brochures, journals, media, case studies, speeches, websites, books, government publications or

documents, census data and focus groups. Generally, secondary data sources can exist in the form of written or visual. Through qualitative methods were obtained through telephone interviews with Chief Assistant Director of the Department of City Planning, Putrajaya Corporation, Mr. Sim Ee Chai and some individuals concerned with the study. Most of this data is used as reference for further study done and these data were used as additional information to produce better research.

3.1.1 INTERACTIVE MODEL OF RESEARCH DESIGN

By referring to Maxwell (2005), Interactive Model of Research Design has five components, each of which addresses a different set of issues that are essential to the coherence of a study:

1. *Goals:* Why is your study worth doing? What issues do you want it to clarify, and what practices and policies do you want it to influence? Why do you want to conduct this study, and why should we care about the results?

2. *Conceptual framework*: What do you think is going on with the issues, settings, or people you plan to study? What theories, beliefs, and prior research findings will guide or inform your research and what literature, preliminary studies, and personal experiences will you draw on for understanding the people or issues you are studying?

3. *Research questions*: What, specifically, do you want to learn or understand by doing this study? What do you not know about the things you are studying that you want to learn? What questions will your research attempt to answer, and how are these questions related to one another?

4. *Methods*: What will you actually do in conducting this study? What approaches and techniques will you use to collect and analyse your data, and how do these constitute an integrated strategy?

5. *Validity*: How might your results and conclusions be wrong? What are the plausible alternative interpretations and validity threats to these, and how will you deal with these? How can the data that you have, or that you could potentially collect, support or challenge your ideas about what's going on? Why should we believe your results?

In this model, the different parts of a design from an integrated and interacting whole, with each component closely tied to several others, rather than being linked in a linear or cyclic sequence. The most important relationships among these five components are displayed in Figure 3.0:

Figure 3.0
An Interactive Model of Research Design
Source: Maxwell, 2005

3.2 SELECTION OF RESEARCH AREA

According to Spradley (1980) *in* Marohaini Mohd Yusoff (2001), each investigator will have different reasons for selecting a particular setting for research. Most of the qualitative study conducting fieldwork for data collection purposes. Determination of choice of where the case study should also consider the assessments of the nature and needs to ensure that the place that have been chosen does not limit what is to be studied. Appropriate to the research topic, researchers have chosen Putrajaya as a study area because of Datuk Seri Mohd Najib Bin Tun Abdul Razak, the Prime Minister when tabling the Tenth Malaysia Plan ago and has declared Cyberjaya and Putrajaya as a model pilot (Berita Harian, 9 Mei 2011).

3.3 PROCEDURES AND MEASURES OF DATA COLLECTION

This section will describe some of the procedures undertaken to design and implement the data collection process. As the data collection process is complicated, it must be planned and carried out carefully.

The research methods for this study will use a qualitative method. It will rely on analytical approach. The data for this study will be collected mainly from two sources that are primary and secondary data. For the primary sources will using research reports, speeches, press release, newspapers, security policies, resolutions, agreements, reports, laws, along with other official state key document to make an accurate analysis.

For the secondary sources, it is work to literature that includes sustainable development, environmental agenda, green cities and quality of life. The secondary sources consist of some useful scientific articles that are focusing more to development and environmental studies, books, academic and research journals, electronic journals such as JSTOR, Emerald, Malaysia Journal of Environmental Management, thesis statistic data quantitative from reliable sources and magazines.

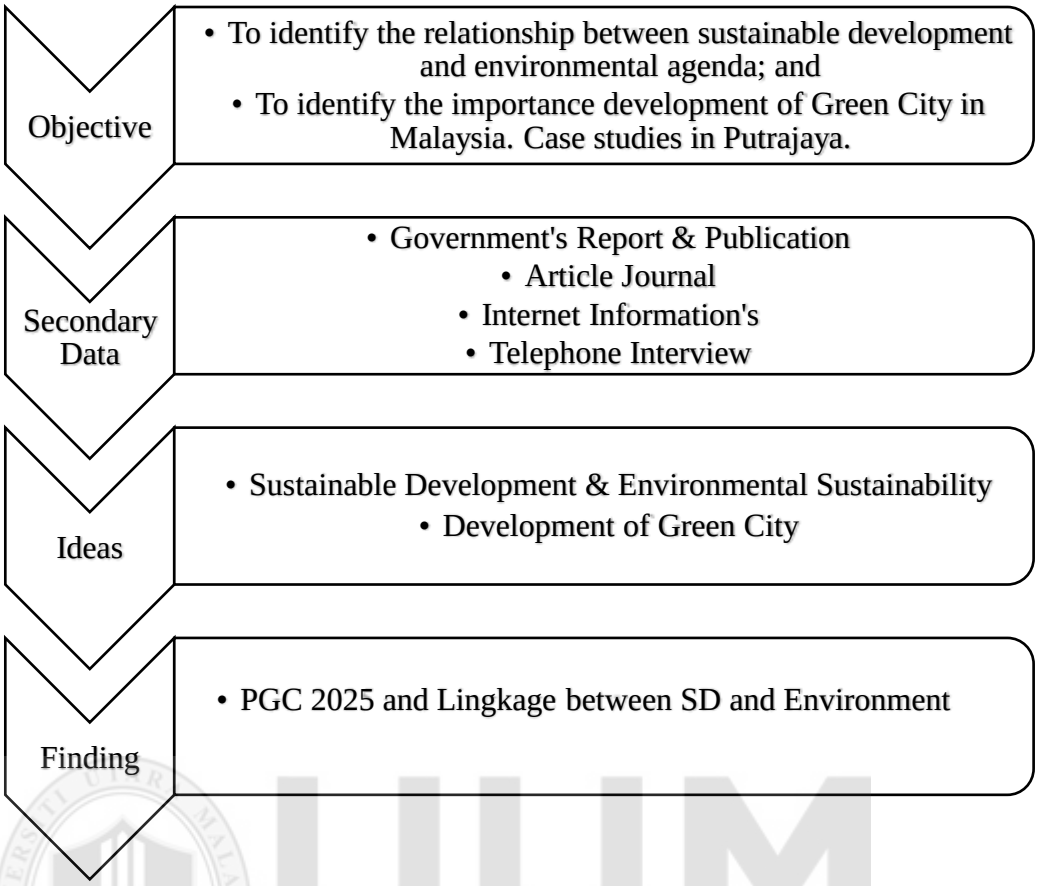

Figure 3.1: Theoretical Framework

3.6 CONCLUSION

A method in a research study is important. This is because; every method that researchers use will affect the data and information that will be obtained by the researchers. In addition, the methodology of the study is also needed to enable a data gathering it in a more systematic and facilitate researchers to conduct research.

CHAPTER 4

RESULT AND FINDINGS

4.0 INTRODUCTION

The concept, definitions and interconnections of sustainability are crucial for better understanding and communication in the process of moving our nations or societies toward sustainable development (Rawshan Ara Begum *in* Abdul Samad Hadi, et. al, 2013). During the last few decades, many methods and approaches have emerged for measuring sustainability with over 600 projects listed in the Compendium of Sustainable Development Indicator Initiatives (IISD 2006) (Rawshan Ara Begum *in* Abdul Samad Hadi et al. 2013).

Putrajaya a model city - the Federal Government Administrative Centre, in accordance with this study, as the basis for the Putrajaya Green City, the following (Table 4.0) are some basic data for the development glance at Putrajaya.

Basic Facts and Figures	
Area	4,931 ha
Planned Population	320,000
Daytime Population	500,000
Government	3.8 million sq. m (original plan) 4.3 million sq. m (revised)

Commercial	3.4 million sq. m (original plan) 4.3 million sq. m (revised)
Housing Units	63,453 units (revised) (55% Government) (32% Public) (13% Affordable House)
Progress of Development	
Resident Population	72, 413 (census 2010) 80,000 (2012)*
Government Office Workers	61,681 Worker*
Government Office (Gross Building Area)	3.78 million sq. m (completed) 0.08 million sq. m (under construction) 0.46 million sq. m (under planning)
Commercial Space	447,227 sq. m (completed) 245, 483 sq. m (under construction)
Residential Units	26,647 units (completed) 1,611 units (under construction)

Table 4.0
Putrajaya Facts and Figures
Source: Azhar Othman, Perbadanan Putrajaya (2012).

As been discussed before in chapter 2, the term sustainable development forms the core organizing theme that integrates environmental, economic and social consideration into a new development. Putrajaya as the new city have been getting away by this environmentally and human friendly development as figure out inside the sustainable development concept. As mentioned by Baker, S. (2006), the model is built upon normative principles that promote equitable access to the planet's limited resources in order to promote human needs, whether they are physical, cultural, spiritual or social.

This normative principles drive a model of development that protects the planetary resources, whether they are physical, in the form, for example, of oil or gas, or systematic, in the form of the climate system, while it also promotes the use. It accepts a hierarchical interdependence between economy, society and nature: society is possible without market economy, but neither society nor the market economy is possible without the natural environment (Baker, S., 2006).

4.1 MEASURING SUSTAINABILITY

The indicators are useful for tracking sustainable development trends and understanding the various dimensions of sustainable development and their complex interactions. There have been applied to the measurement of sustainable development. Many of these indices use similar types of methods to aggregate the data but differences exist in their results due to different assumptions, bias, proxy data and methodological disparities, such as weighting, normalizing, aggregating, etc. in sustainability efforts. In Malaysia, there are two indices from Malaysian initiatives for the performance of sustainable development policies namely Malaysian Quality of Life Index and Malaysian Urban Sustainability Indicator.

By referring to the Putrajaya Green City 2025: Baseline and Preliminary Study, our daily consumption preference influences our waste generation. In order to balance the economic growth and the natural resources

saving with our concern towards sustainable development, it is important to reduce consumed good, as a result, this consumption lifestyle depresses GHG emission as well as waste production.

4.1.1 MALAYSIAN QUALITY OF LIFE INDEX

The Economic Planning Unit (EPU) of the Prime Minister's Department first published the Malaysian Quality of Life Index (MQLI) in 1999 which provides a composite index measuring sustainable living /well-being. The reports defined quality of life as encompassing personal advancement, a healthy lifestyle, with access and freedom to pursue knowledge, and attaining a standard living which surpasses the fulfillment of the basic and psychological needs of the individual, to achieve a level of social well-being compatible with the nation's aspiration (Rawshan Ara Begum *in* Abdul Samad Hadi et al. 2013).

According to the MQLI 2011 report released by the Economic Planning Unit (EPU) of the Prime Minister's Department, the quality of life in Malaysia has improved during the 2000 to 2010 period, where the Malaysian Quality of Life Index (MQLI) increased by 11.9 points from 100 points for the base year 2000 to 111.9 points in 2010. The education component recorded the highest increase of 20.4 points, followed by transport and communications (20.3 points) and housing (15.7 points). The report said the greater participation rates in pre-school and secondary school levels, better

teacher-students ratios a well as higher literacy rates resulted in an improved education sub-index. The increasing number of private car ownership and rapid development in communications technology contributed to the increased transport and communications sub index.

The housing sub-index benefited from a significant rise in the percentage of low-cost housing units to total low-income households and the percentage of housing units with piped water and electricity. Other components measured in MQLI were culture and leisure, income and distribution, public safety, health, social participation, environment, family life and working conditions also recorded improvements. The overall performance of these indices was in line with the national aspiration to achieve high-income developed nation status by the year 2020.

4.1.2 MALAYSIAN URBAN SUSTAINABILITY INDICATOR

The Federal Department of Town and Country Planning Peninsular Malaysia developed the Malaysian Urban Indicator Network (MURNInet) which refer to an approach to measure and evaluate urban sustainability of Malaysian cities and towns through 11 planning sectors which is divided into 55 urban indicators. There are eleven planning sectors, the demographics, housing, economy, infrastructure, community and recreational facilities, environment, sociology and social impact, land usage, tourism and heritage, transportation and accessibility, and management and finance (Rawshan Ara Begum *in*

Abdul Samad Hadi et al. 2013). The MURNInet application system is based on a computer network designed to analyses the information from indicators gathered from cities and towns. This approach is implemented by all local authorities in Malaysia. Overall scores are categorized into three scale;

Scales	**Sustainability**
0% - 50%	Unsustainable City
50% - 80%	Semi-sustainable City
80% - 100%	Sustainable City

Table 4.1
Scale of Sustainable City
Source: (Rawshan Ara Begum *in* Abdul Samad Hadi et al. 2013).

According to MURNInet through its website, so that the latest data updated, namely in 2013, Putrajaya sustainable status with a share of 82%. Based on that number, it indicates that the development of existing and future Putrajaya in line with its goal to achieve the status of 'Green City Putrajaya 2025'.

4.2 A DOZEN ACTION TOWARDS GREEN CITY

According to a study entitled 'Green City in 2025 Putrajaya: Baseline and Preliminary Study "conducted by Prof. Ho Chin Siong (2012) in collaboration with several institutions of higher education as well as statutory bodies, through the review, he has recommended a total of 12 actions regarding the implementation of the green city of Putrajaya. As first trial for Putrajaya Green City Study, this report mainly focus on the first phase, developing the 'vision'.

Towards achieving a Green City in Putrajaya, 12 actions are introduced here in this study. These actions are divided according to the three environmental targets. The goals for Putrajaya Green City 2025 (PGC2025) in term of quantitative environmental targets are outlined in three themes. The three themes are "Low-carbon Putrajaya" for climate change mitigation, "Cooler Putrajaya" for mitigating urban heat environment, and "3R Putrajaya" for recycle-based society.

There are 6 low-carbon actions introduced here, these low-carbon actions propose measures which can be undertaken by Putrajaya Corporation (PJC), various relevant authorities and individuals towards reducing the greenhouse gas (GHG) emission in Putrajaya. Three actions are introduced in efforts to reduce waste using the 3R (Reuse, Recycle and Reduce) and waste management. Two actions for the reduction of peak temperature by 2°C are introduced for the "Cooler Putrajaya" scenario.

1. Action 1: Integrated City Planning and Management

Urban planning in Putrajaya involves mixed land use planning, massive tree planting activities and traffic planning. Integrated urban planning approach underlines good practices in urban development, and it has to go hand in hand with simultaneously activities which are related to policy sectors; both medium and long terms. The promotion of low-carbon policies has to be a main theme especially in related sectors; residential, transportation, commercial, public amenities and utilities, government institutions and power generation land use.

In planning towards a low-carbon city, non-motorized movement by walking and cycling are highly encouraged as a mode of travelling through the provision of an integrated network of pedestrian/cycling paths. These integrated networks are planned comprehensively to link together the numerous public facilities, social amenities and commercial centres with residential areas. Putrajaya becoming a Garden City which is well known for parks and green, should make good use of this special feature and further encourage non-motorized mode of transportation. To realize this, the relevant authorities should play an important role in ensuring the safety of the cycling paths and walkways.

As Putrajaya's population is expected to increase 7 times in size from 2007 to 2025, this city has to continuously develop to provide for the growing needs of its residents. Putrajaya city planning is driven by sustainable

concepts. The sustainable planning concept will help shorten the passenger transport lengths and vehicle mile travel (VMT), and in some cases will help to further promote cycling and walking trips.

2. Action 2: Low-carbon Transportation

Through this current study, it is identified that the passenger transportation sector in 2007 is the second highest contributor of GHG emission; contributing about 31% of the total emission of 161ktCO²eq, and this number will increase about 8 times in Business as Usual (BaU) case in 2025 with total contribution of 1,314ktCO²eq.

By switching from fossil fuel to renewable energy source is one of the effective actions in low-carbon transport policy actions. PJC should promote and encourage the use of Electric Vehicles (EV) and Hybrid Vehicles (HV) by planning the supporting facilities such as service station. In order for more effective implementation, intelligent transportation system (ITS) should also be introduced in Putrajaya. The ITS will manage factors such as vehicles, load, routes to improve safety, reduce vehicle wear, transportation times and consumption.

An integrated transportation system is designed to economically move anyone, anything, anywhere, anytime on time. The central areas of Putrajaya are well connected with each other by public transportation networks. Currently, natural gas buses and taxies are already operated in Putrajaya;

however this number should be increased to meet the increasing demand. In addition to this, the existing rail base network and facilities should be utilized and widened to support the existing public bus and Express Rail Link (ERL) services. To encourage a higher usage of public transportation, Putrajaya has to convince its residents and commuters that use of the public transportation is not only convenient but also can be trusted to be on time.

3. Action 3: Cutting-Edge Sustainable Building

Since buildings are identified to be high GHG emitter, this action will also be the highest reduction target; which will contribute 33.2% (about 666ktCO^2eq) of the total emission reduction in Putrajaya. The energy consumption of buildings in Putrajaya, mainly due to three main sectors, namely; government, commercial, residential and public amenities and facilities.

PJC can promote appropriate and advanced tropical sustainable buildings by using Asian oriented methodologies, technologies in order to sustain buildings with long life and high performance. PJC or relevant government organizations should adopt existing building evaluation methods, e.g. Green Building Index (GBI), Leadership in Energy and Environmental Design (LEED), Comprehensive Assessment System for Built Environment Efficiency (CASBEE) and etc., to label buildings. Putrajaya should work towards achieving a standard where all governmental buildings will be labelled as green building. At the same time, it will continue to improve the

energy saving efficiency and GHG reduction efficiency measures for all buildings.

PJC commences an energy efficiency labelling system for buildings. This newly developed evaluation method aims at long-term energy saving target. The certification and registration of labelling will be mandatory at the time of purchase for newly-built houses, at the time of renovation for existing buildings, and also at certain intervals for lease properties and commercial buildings.

4. Action 4: Low-carbon Lifestyle

The residential sector in Putrajaya contributes about 23ktCO^2eq to the total GHG emission in Putrajaya in 2007. However this number increases about 11 times higher to 266ktCO^2eq in 2025.low-carbon lifestyle is an action which concentrates on measures that involve the public. Practical use of Information and Communication Technologies (ICT), such as Home Energy Management System (HEMS) has made it possible for autonomous operation and control of appliances. This system will automatically suspend the operation in spaces and periods of time when people are not present. The citizens also should be more aware and educated on the energy saving behaviours' which can be practiced at home.

5. Action 5: More and More Renewable Energy

The power generation for the energy demand in Putrajaya is supplied from outer boundary. PJC together with the suitable agencies should encourage the installation of low cost photovoltaic systems in housing areas. It is possible to design and install them on various parts of buildings including the roof, walls and windows to ensure it will not affect the townscape and aesthetic value of the building. Here in Putrajaya, photovoltaic panels should also be used by other buildings such as government offices, department buildings, and commercial buildings.

The advantageous effect is expected to reduce 50ktCO^2eq which contributes about 2% in total reduction. Currently with the collaboration with Tenaga Nasional Berhad (TNB), PJC has started a 5 megawatt solar farm project. PJC can also promote the diffusion of autonomous and grid-independent system for renewable energy generation while minimizing its influence on existent power systems. In addition, beyond individual energy storage systems, some precincts should have their own electricity supply systems that adjust demand and supply of electricity within the precinct by joint utilization of solar, wind and biomass.

6. Action 6: The Green Lung of Putrajaya

Putrajaya city is among the few planned cities in Malaysia that have more than a third of total area allocated for functional green open spaces. These

planned urban green in the forms of urban parks, city parks and pocket parks at the neighbourhood area provide residents with the opportunity to experience greenery, nature and wildlife at the door steps. Trees planting by the pedestrian walkway and urban parks help to absorb GHG emitted from the vehicles on the streets. The carbon sink by tree planting is expected to reduce 35ktCO²eq, which contributes 1.8% in total reduction.

In this action, a total of one million trees should be planted in Putrajaya by 2025. Putrajaya firstly has to develop a tree inventory database to identify the types of tree which are planted around this area, so that the carbon accounting can be done. It also helps Putrajaya to determine the specific species of tree which can be panted around the suitable areas in Putrajaya. Therefore, there has to be enhancement in the city planning practices to plant more suitable trees for these areas. Putrajaya also has a very big water body which compasses about 600ha (lake and wetlands). This can be used for rainwater harvesting.

7. Action 7: Cooler Urban Structure and Building

Mitigation measures of an urban heat island (UHI) demonstrate a big effect not only to raise a comfort of local residents but also to bring a co-benefit with low-carbon policies. In Asian region especially in hot and humid climate, wind velocity is the most effective factor to increase pedestrian comfortable environment, even if either air temperature or humidity are high. Greening has a strong effect in mitigation of UHI. Since Putrajaya is

abundant in open space and water front, if a suitable plant is grown, the relaxation of UHI can be maximized. In order to promote well consideration for UHI, design guideline is effective tool such as CASBEE-Heat Island (HI).

8. Action 8: Community and Individual Action to Reduce Urban Temperature

One of the reasons of urban heat island is an artificial exhaust heat. The major sources of artificial exhaust heat in Putrajaya are the waste heat from air conditioning and automobiles. So, the modal shift to public transportation can reduce the exhaust heat from vehicles and the energy saving actions can suppress the exhaust heat from building. Other than that, by watering the pavement where the temperature becomes very hot by direct sunlight can reduce ambient temperature. In addition, water sprinkling to the pavement and grassland enhances the evaporation and reduce surface temperature. PJC plans several countermeasures for UHI and these actions also help reducing GHG emission. The advantageous effect is expected to reduce 45ktCO^2eq, which contributes 2.2% in total reduction.

9. Action 9: Use Less Consume Less

Our daily consumption preference influences our waste generation. In order to balance the economic growth and the natural resource saving with our concern towards sustainable development, it is important to reduce consumed goods, as a result, this consumption lifestyle depresses GHG emission as well as waste reduction.

Reduce is the first pillar of 3R in solid waste management (SWM). It is defined as reducing the amount of waste by increasing the efficiency of resource use and extending the useful life of products. Efforts of reduction activities save money not only of household but also of authority's waste treatment cost.

By practice of 'reduce' activities in home, GHG emission from household waste can be reduced by 2.85ktCO²eq, which contributes 93% of the reduction by this action. Remaining 6% and 1% are carried out by restriction of plastic bag use in business sector and promotion of IBS (Industrialized Building System) which should be applied in 70% of future building construction.

10. Action 10: Think Before You Throw

Before we throw useless things, we should think of ‘reuse’ and ‘recycle’ to reduce GHG emission as well as waste. Reuse and Recycle are the second and third pillars of 3R in SWM, and respectively mean to repair for longer use, to use in other manner or to pass to who desires and to process it in order to get back to the products or their materials. This action contributes to reduction of 13ktCO^2eq in 2025.

However, before waste products are sent to the final treatment, some can be reused after going through minor pre-treatment. Buy back centres in Putrajaya provide the public opportunity to sell their unneeded items. The centre was launched in August 2010. Currently there are two permanent and three mobile centres that are operating in Putrajaya.

PJC together with Alam Flora, provide household and offices garbage bins for waste separation. It is targeted by 2025 that waste separation, recycling and composting centre allocation become mandatory in Putrajaya. Industrial building system suppresses waste generation at construction site by prefabrication of construction material.

11. Action 11: Integrated Waste Treatment

Recycle, treatment and disposal facilities support to the robust solid waste management. There are several options for waste treatment in order to recover all the valuable resources and to minimize the needs to use virgin materials. In order to enhance recycling activities in Putrajaya, in 2025 more buy back centre should be provided. To save energy and cost, an integrated solid waste recovery facility will necessary to be constructed as a recycle home base.

Other than that, thermal treatment will be built. This is a treatment process that involves the combustion of organic substances contained in waste materials. It can significantly reduce the necessary volume for final disposal up to roughly 90% in volume. Another benefit is that this treatment produces power in the process of waste burning.

'Pay as you throw' system is known as unit pricing or variable-rate pricing. Due to the introduction of this system, household in Putrajaya will be charged according to the amount of their discharged waste. This program will create direct incentive to recycle more and generate less waste.

12. Action 12: Green Incentives and Capacity Building

The green incentives and capacity building action with the support of national government has to be established to ensure businesses with potentials to create and operate low-carbon market are able to realize it in Putrajaya. Supply of low carbon, high value-added goods and services through energy efficient production systems should be actively encouraged through the introduction of appropriate policy measures.

Business derivate by economic incentive programmes to encourage business organizations to support GHG emission reduction targets set by PJC should be introduced and internalized by those organizations through setting their own emission reduction targets voluntarily. Government organizations and departments should also actively in the services provided to/by government organizations and department.

Demand pull by 'low-carbon' value permeation. Consumers have come to prefer low-carbon products and services and accordingly, companies are increasing their development investment in low-carbonization of their manufacturing technologies and services. Moreover, the Ministry of Education in collaboration with PJC should create educational materials and curriculum to match the capacity for all school going children. In educational institutions from primary to secondary schools, environmental education should become a compulsory subject and must be implemented in various educational programs.

Summarization

Sustainability concept is clearly evident in the designation of almost 40% of its total city area of 4,931 hectares specifically for green and open spaces in the Putrajaya Master plan. The detailed actions names and the amount of GHG emission reduction contributed by each action can be seen in Table 4.2 below.

Action No.	Name of Actions	GHG Emission Reduction ($KtCO^2eq$)	Contribution in Total Reduction (%)
1.	**Integrated City Planning and Management**	306	13.8
2.	**Low-carbon Transportation**	574	25.9
3.	**Cutting-edge Sustainable Building**	673	30.4
4.	**Low Carbon Lifestyle**	71	3.2
5.	**More and More Renewable Energy**	50	2.3
6.	**The Green Lung of Putrajaya**	35	1.6
7.	**Cooler Urban Structures and Building**	63	2.9
8.	**Community and Individual Action to Reduce Urban Temperature**		
9.	**Use Less Consume Less**	8	0.4
10.	**Think Before**	332	15.0

	you Throw		
11.	**Integrated Waste Treatment**	100	4.5
12.*	**Green Incentives and Capacity Building**	-	-
Total of PGC2025 Actions		**2213**	**100**
Other**		**398**	**-**
Total		**2611**	

*Actions 12 do not have its emission reduction.
** It includes contribution from freight transport (2.7%) and central power generation (13.5%).

Table 4.2
CO^2 Emission Reduction Amount
Source: Putrajaya Corporation, 2012.

Sustainable development has been long embedded Putrajaya in line with its Garden City theme. By 2025, in the 10 years from now, this Garden City will be transformed into a Green City where environmental sustainability will be achieved by reducing carbon footprint through preservation of green areas, green and healthy living, alternative energy consumption, reduction of waste, alternative transport mode and other green initiatives.

According to Putrajaya Corporation (2011), other key measures in transforming Putrajaya into a Green City will be to adopt sustainable building practices and encourage the application of green technology in city planning and management. Reduction and renewable of energy, water and waste will be the aim in adopting sustainable building practices and, city planning and management. The Green City initiatives laid in these policy will form a

roadmap towards establishing and reaching the targets of carbon footprint reduction.

4.3 CONCLUSION

As a conclusion, everywhere around the world, city planners continuously seek to strike a balance between the quality of life and the need for better city planning, better housing and better public services. Countries such as New Zealand and Canada have their Garden City in Christchurch and Vancouver respectively. With Putrajaya, Malaysia planned for a garden city that was stylish, real and authentic, and equipped with the latest technology to be a model of efficient Federal administration. Maybe it was a tall order, but it was not impossible, as is clearly evident. Fully integrated and self-contained, it is a showcase of excellence in distinctive design, technological advancement and city planning innovation.

Putrajaya has since come to symbolize the branding of Malaysia. That it is an ambitious plan is without a doubt. The US$8.1 billion city is still undergoing construction – much needs to be done. Lead developer Putrajaya Holdings, in partnership with four property developers – Peremba Sdn Bhd, SP Setia Bhd, Hong Leong Properties Bhd and E&O Property Development Bhd – is responsible for developing the residential precincts outlined in the Putrajaya Master Plan. Named after the country's founding father and first Prime Minister, Tunku Abdul Rahman Putra Al-Haj (the suffix 'jaya' means

'success'), the city features its uniqueness, which is further enhanced by another model intelligent city. Together Putrajaya and Cyberjaya symbolise Malaysia's aspirations to be a key player in the global ICT arena (www.putrajaya.gov.my).

CHAPTER 5

DISCUSSION, SUMMARY AND RECOMMENDATIONS

5.0 INTRODUCTION

This chapter is the last chapter in this study and aims to formulate the overall study was undertaken. In this chapter, the conclusion will be made on the study's findings are consistent with the achievement of the overall objectives of the study. The findings discussed in more detail about creating formulas, discussions and proposals related. In addition, this chapter concludes the study's findings are consistent with the achievement of the overall objectives of the study. The findings are summarized by the objectives specified in chapter 1;

I. To identify the relationship between sustainable and environmental agenda; and

II. To identify the importance development of Green City in Malaysia. Case studies in Putrajaya.

5.1 DISCUSSION

5.1.1 First objective: To identify the relationship between sustainable development and environmental agenda.

In order to meet the challenges of environment and development, the primary need is to integrate environmental and developmental decision-making processes. To do this, Governments should conduct a national review and, where appropriate, improve the processes of decision-making so as to achieve the progressive integration of economic, social and environmental issues in the pursuit of development that is economically efficient, socially equitable and responsible and environmentally sound. Countries will develop their own priorities in accordance with their national plans, policies and program.

To support a more integrated approach to decision-making, the data systems and analytical methods used to support such decision-making processes may need to be improved. Governments, in collaboration, where appropriate, with national and international organizations, should review the status of the planning and management system and, where necessary, modify and strengthen procedures so as to facilitate the integrated consideration of social, economic and environmental issues. Governments, in cooperation, where appropriate, with international organizations, should adopt a national strategy for sustainable development based on, inter alia, the implementation of decisions taken at the Conference, particularly in respect of Agenda 21.

This strategy should build upon and harmonize the various sectorial economic, social and environmental policies and plans that are operating in the country.

Lastly, countries, in cooperation with national institutions and groups, the media and the international community, should promote awareness in the public at large, as well as in specialized circles, of the importance of considering environment and development in an integrated manner, and should establish mechanisms for facilitating a direct exchange of information and views with the public. Priority should be given to highlighting the responsibilities and potential contributions of different social groups.

5.1.2 Second objective: To identify the importance development of Green City in Malaysia. Case studies in Putrajaya.

Through observation over the years, the development of green city program in Putrajaya in controlled conditions and on target. Putrajaya Corporation constantly monitor all developments that have been, are and will be carried out from time to time. Although the process is a bit heavy but very big impact on the successful achievement of the primary intention to make Putrajaya as a green city by 2025.

As an initial step Putrajaya Corporation has started to conduct a six-month study of 'Feasibility study - Towards Putrajaya Green City 2025' since

June 2010 with local experts and Japan. Among the institutions involved are Universiti Teknologi Malaysia (UTM), Kyoto University, Okayama University, National Institute of Environmental Studies (NIES) and Malaysia Green Technology Corporation (MGTC).

This study has recommended three main themes that should be addressed by Perbadanan Putrajaya to achieve the status of Low Carbon green city of Putrajaya, Putrajaya and Cooler 3R Putrajaya. This study identified the current situation and future scenario and quantitative targets. Findings of this study will provide the basis for the direction of Perbadanan Putrajaya towards making Putrajaya as the Green Cities pioneer in Malaysia.

The adoption of green practices and the involvement of civil society and the whole is a very big impact in the development and implementation of this green city program. To ensure the sustainability and success of this program, local authorities, namely Putrajaya Corporation and the government and the whole community must mobilize and continue along the green city program so that it achieves its goals.

5.2 SUMMARY

One of the most disputed questions in this context relates to the relationship between development and environment, and how we should understand the impact of environment on development across the world. I was reading in the

book of 'Global Political Economy' written by Ravenhill, J. (2014, pp. 346) … ‘what they meant by this desirable objective of “development” would get a great variety of answer:

> “Higher living standards. A rising per capita income. Increase in productive capacity. Mastery over nature. Freedom through control of man’s environment. Economic growth. But not mere growth with equity. Elimination of poverty. Basic needs satisfaction. Catching up with the developed countries in technology, wealth, power, status. Economic independence, self-reliance. Scope for self-fulfilment for all. Liberation, the means to human ascent.” – H. W. Arndt (1987).

Likewise, environmental approaches emerged from the early 1970s onwards as critiques of the view of the relationship between environment and development that had prevailed in post-war growth and modernization theory as well as neo-liberal approaches. According to Philips, N. (2014) *in* Ravenhill, J. (2014), the linkages between environment and development thus became a matter of global concern and had moved belatedly, along with poverty and gender, to the centre of development debates by the end of the 1980s, clothed in the concept of ‘sustainable development’. Once again, this was defined famously as ‘development that meets the needs of the present without compromising the ability of future generations to meet their own needs’ (WCED, 1987). To this end, the ambitious call was issued for a reorientation of economic activity and development strategy to focus on human development and the needs of the poor, noting that unequal distribution of and access to resources, as well as vastly unequal patterns of resources consumption, contributed to both the perpetuation of poverty and the steady destruction of global environment.

The optimists see development as a process that fosters economic growth and raises per capita incomes, both essential to generate the funds and political will for global environmental management. Optimists see other environmental benefits from development as well. The capacity of a system of sovereign states to manage problems such as ozone depletion and climate change will be enhanced through the promoting of global integration and cooperation as well as common environmental norms and standards. In order to work toward sustainable development, it is important for example, Malaysia to first decide what its development goals are, in social, economic, and environmental terms.

Besides, there is a need to ensure that both quality and sustainability "greenality" are built into our thinking about a project, rather than bolted on as an afterthought (Yeong Liang Sim Frederik Josep Putuhena, 2015). This development involves many parties, including the government acting to change, and formulate policies to make this development a reality as described. People could not escape from making this successful development for the majority of the community is a group that supports various government policies to make healthy environment, while the private sector should take the same responsibility for sustainable development is development that is beneficial to all parties. Corporate social responsibility (CSR) related to sustainable development is expected to enlighten all concerned the importance of sustainable development or sustainable.

According to Yeong Liang Sim Frederik Josep Putuhena (2015), the hot and humid climate is one of the biggest challenges to urban designers in Malaysia, as daytime temperature rise above 30°C (86 –90 F) throughout the year. One of Putrajaya's main shortcomings is that the climatic response in landscape architecture is minimal. With great design freedom, an expansive budget and an explicit goal of creating a 'garden city', the designers for Putrajaya have missed an important opportunity to advance microclimatic design as it can be seen in walkways as they are mostly not covered nor they are shaded by trees so the pedestrians are expose to direct sunlight. This situation can be felt by me, myself when walking around Putrajaya. However, this condition does not apply in the whole area of Putrajaya, just a few areas that are new and have not grown plants can be shading. Moreover, passionate Perbadanan Putrajaya to implement transport modes have not yet managed to 30:70. 30:70 this mode refers to the 30% use their own vehicles while 70% use public transport.

Putrajaya Corporation strives to improve public transport facilities to be used by Putrajaya residents and tourists who come to visit Putrajaya (Putrajaya Corporation, 2011).Therefore, to make passionate Putrajaya as the Green City by 2025, the mobilization of all parties should be to achieve that status. Parties involved, including the public should know and assess their understanding of the importance of this concept to every aspect needed in the implementation of this concept can be carried out smoothly. Various efforts have been, are and will be run by the government hopes to boost Putrajaya

name and status as a federal administrative centre of Malaysia in implementing cultural or sustainable development in the eyes of the world.

As a conclusion, the Malaysian Government's sustainability agenda has prioritized the balance between socio-economic and ecological systems to avoid further environmental damage. However, such balance has not successfully been reached due to the construction industry's continuing contributions to social and problems. By referring to figure 5.0, the synergy between the enabling environment, organisation and individual attributes in the process of knowledge management will influence the adoption of capacity development model to manage the environment and up keeping of the quality in the Malaysian construction industry. All parties includes the government, real estate company, construction developers, construction contractors, entrepreneurs, as well as the specific individual organisation must work together to uphold government's initiatives and sustainability by applying the elements of technology advancement in each of their green building projects.

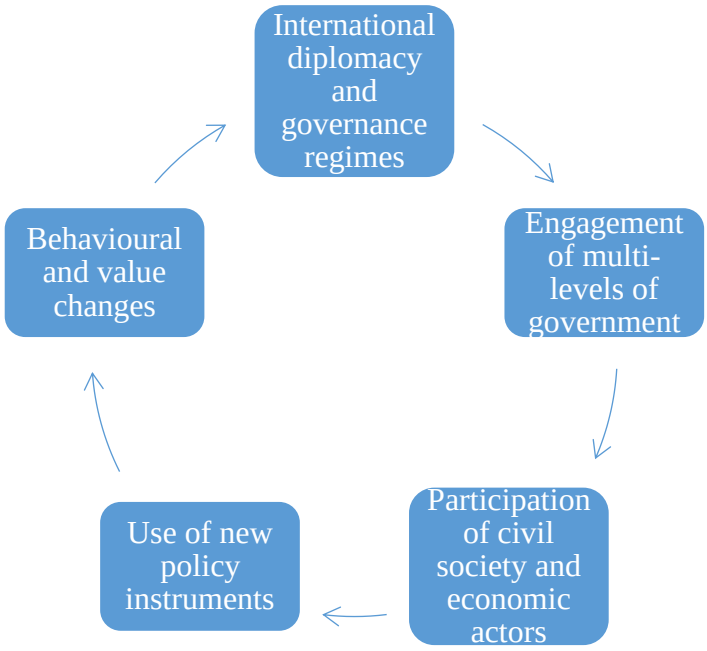

Figure 5.0
Promoting sustainable development involves multi-dimensional actions.
Source: Baker, S. (2006)

5.3 LIMITATION OF STUDY

In conducting this study, limitations faced study are as follows:

I. Constraints of time where the time available for the preparation of this project is very limited, especially in connection with field studies conducted.

II. Financial constraints in terms of where this study was conducted in the Federal Territory of Putrajaya and the cost to bind the final report of this study.

III. I cannot get some response from several government agencies that related to this study.

5.4 PROPOSAL

Because this study only involves only an area that is inapplicable, it is proposed that a future study to compare among several areas. It aims to assess the level of implementation and effectiveness of the Green City Program in Malaysia in general.

In addition, the researchers propose that this green city can be implemented properly so that it is not only beneficial for the environment, but any use of green technology or environmentally friendly facility was adapted by the user according to the man. Each green innovation must think positive response to the user.

5.5 CONCLUSIONS

Based on the discussions and recommendations above, it can be concluded that the level of implementation of the program the green city is still in the initial phase. Lack of knowledge of this concept is also at a satisfactory level. However, the point to be considered by the population in this area is to enable and assist the Perbadanan Putrajaya accordingly.

Participation of the whole population as well as investors and developers in the activities and development undertaken is essential in improving the effectiveness and helping to ensure the success of the implementation of the concept of green cities in the Federal Territory of Putrajaya Malaysia in particular and the general. For this purpose, the role of Perbadanan Putrajaya as the local authorities seemed so important in providing information to all those involved in ensuring the successful implementation of the Green City Program in this area.

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