

Sustainability of Green Technology in Malaysia Industry

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Abstract-*The green technology is an innovation form of energy and has become the popular issue in Malaysia. This paper is to explore the opportunities by support of innovation development which brings to sustainability of green technology in Malaysia. Through literature review and empirical evidence, the Malaysian government has played a role in a strong condition to make sure the sustainability of environmental by introducing the strong policies. The establishment of incentive and budget of green technology can be fully utilized by the nation. The study is the first attempt to explore the innovation development in green technology in Malaysia*

Keywords: *Innovation management, green technology, research and development.*

I. INTRODUCTION

Innovation management is about the internal and the external environment that give the impact to the organizations. This innovation management can give different levels of the organization to compare with their rivals. With good strategies and objectives, they can use the innovation management to set the benchmark of their organizations [11].

A few years back, environmental and green issues were popular and famous among the experts and the researchers. The ISO 14000 had been approached to focus on the environmental issue and gave a positive impact to the entire world. They tend to look at the products that have been set with good safety standard and practices [3]. From that issues, green technology has arisen drastically and all organizations nowadays are implementing the same strategy on saving the environmental and attract the attention of society.

However, there are some issues on sustainability of innovation model that are used in green technology. High technology products need a good innovation to be competed in the same industrial in Malaysia. The marketers require collaborative among their groups from different functional specialities to fulfill customers' demand [7].

II. LITERATURE REVIEW

The strategy to innovate new things is a really important value to be looking for [11]. Types of innovation that must be concern are on the product, services, process, market and technology. The newness of innovation is

requiring a different research and development management practices. The development of national innovation systems is the introduction of the role of the innovation in the element to comprise the national innovation system [8]. The most important determinants of these types of innovation include R&D, university research, highly skilled labour and the network and firm characteristics. Knowledge is the most important factor in the form of building great human capital and technology and also the key drivers to economic growth [8].

There are several developing countries that use these innovation model practices to ensure the success on developing their R&D and also creating products with a good quality and utilize for every people in the entire world [13]. The United States, one of the developing country has dominated their market through innovative practices. The firm has displayed the great attribute and behaviour that can be grouped for the innovation model practices to be implemented by the industries in United States and other developing countries. The three models in primary categories have been given 100% focus by the manufacturer to ensure the successful of their innovation.

Table 1: Innovation model for Key Success Factor. Sources: Warren, 2010 [13]

Primary Categories	Key Success Factors
Internal	IP management, knowledge management, IT applications, maturity, governance, culture, human resource practices.
External	Closeness to customers, supply chain and competitor knowledge, proactive engagement with the environment for acquisition of technology, knowledge.
Bridging	Creative business model, partnership, integration across stages of the product development cycle, balance between external and internal factors.

In a few years back, green technology has been famous among people throughout entire world. Green technology is an innovation to save the environment. Adopting the green technology into late technology is intending to make the earth green free from any harm and danger. Green technology is an innovation form of energy and gives the concept of cleanliness and freshness [6]. Green technology shall be a driver to accelerate the national economy and sustainable development [4]. With the green technology, Malaysia can save energy and minimize the growth of energy consumption while enhancing economic development. Green technology increases the national

capability and capacity for innovation and enhance the Malaysia's competitiveness in the global arena [2].

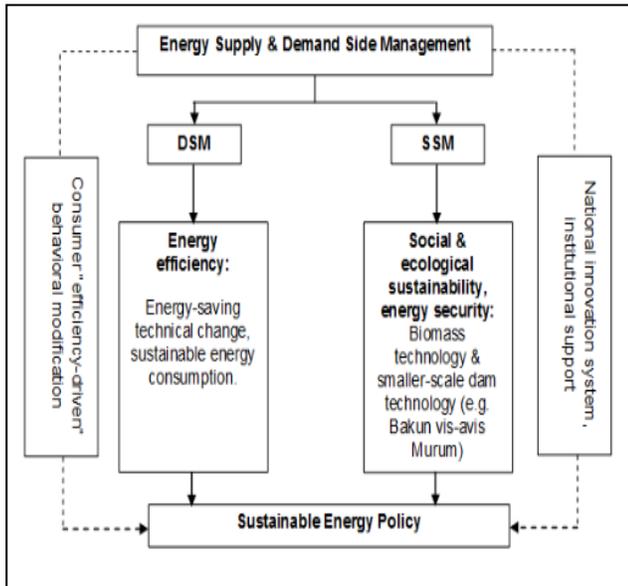


Figure 1: Sustainable Green Model. Source: Keong, 2004

According to Keong (2004)[5], based on the figure 1 is his perceptions on the business opportunities that created by green technology for companies in Malaysia. His attempted to investigate and generalize the relation between the business success factor with the compliance to the entrepreneur in Malaysia.

Green model shows Malaysian companies' readiness towards the implementation of green technology in the industry and lead to the green suppliers, green purchasing, green supply chain and green nanotechnology [3]. The humans' prosperity is depending on the successful of the global tackle on the innovation management towards care about green demand by the consumers for the entire world. It reflects to Malaysian demand on the viability of green technology that is built around Malaysian business [8].

The efficiency driven that has been showed by the Prime Minister, Y.A.B Datuk Sri Najib Tun Razak has pushed forward the green technology to the mainstream ideas and portfolio. It is showed with the green technology financing scheme (GTFS) that leads to improve the innovation development in green technology field [9]. The table 2 of GTFS is as below:

Table 2: Green Technology Financing Scheme (GTFS) Source: Ministry of energy, green technology and water

Features	Producer of Green Technology	User of Green Technology
Financing size	Maximum: RM50 million per company	Maximum: RM10 million per company
Financing tenure	Up to 15 years	Up to 10 years
Eligibility criteria	Legally registered Malaysian- owned companies (at least 51%) in all economic sectors	Legally registered Malaysian- owned companies (at least 70%) in all economic sectors
Government incentive	Government bear 2% interest rate/profit Government guarantee- 60% of financing approved amount	
Guarantee fee	0.5% p.a. from the total guarantee amount	
Interest/financing rates	Determined by participating financial institutions	
Sources of funds	Participating financial institutions	
Implementation agency	<ul style="list-style-type: none"> Malaysian Green Technology Corporation (MGTC) Credit Guarantee Corporation Malaysia Bhd. (CGC) 	

The government has given a full support towards development of green technology that gives benefits and positive impacts to the researches and development field. The proper plan of the innovation development for green technology should be done to ensure there is no rising of conventional energy prices worldwide due to the uncertain obstacle. The paradigm of mind set of Malaysian towards innovation and green technology must be changed to adopt all the opportunities and advantages from that area [9].

According to Ministry of Energy, Green Technology and Water of Malaysia, government gives full encouragement in green foreign direct investment (FDI). FDI inflows into Malaysia with total of US7 billions in 2010 compared to US 1.4 billions in 2009. The number of growth is 409.7% is the highest recorded in the region. Malaysian also recorded as the highest FDI among the 153 economies surveyed by the UN Conference on Trade & Development (UNCTAD) in its Global and Regional FDI Trends 2010 [9]. Below is the major investments in green technology in 2008:

Table 3: Encourage Green FDI. Source: Ministry of energy, green technology and water

Company	Products	Investment (RM)	Job Created
First Solar	CdTe Modules	2 billions	1,200
Q-Cells	Solar cells, wafering & ingot	5 billions	3,500
Sunpower	Solar cell and wafering	5 billions	5,500
Tokuyama	Polysilicon	1.8 billions	500
Renesola	Reclaiming silicon through recycling	-	110-120

The products that have been used are minimizing the energy that give the obstacles to the environment. The companies in Malaysia are also creating more job and increase the economy growth.

III. METHODOLOGY

Literature review analysis is being used in the process of gathering all the information needed. Green technology was analyzed from the literature review from the several of previous authors that had discussed comprehensively about the innovation management and green technology.

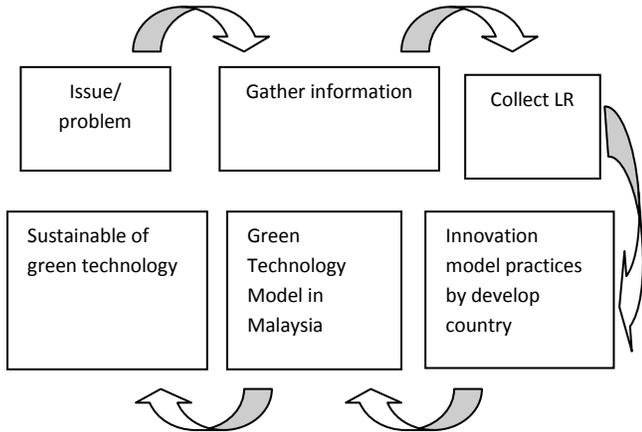


Figure 2: A flow chart of methodology on green technology

This study also used empirical data to get the output. The empirical data are from report, case study, and current data for green technology in Malaysia.

IV. SUSTAINABILITY OF GREEN TECHNOLOGY IN MALAYSIA

Green technology in Malaysia is an issue to be discussed. The first one is the innovation capacity in Malaysia. It will discuss on the successful of Malaysian Government to set up a great plan for implementing a sustainable green technology in the country. Second is the policy that Malaysian government did to control and developed green technology in the country.

Innovation is the implementation of a new or significantly improved the green technology or any products, process or a new marketing method in the industry [12]. Malaysia now is always at the modest level or lower level compared to other developing countries. To measure the great innovation is very complex. Malaysia has a benchmarking on innovation capacity by developing country.

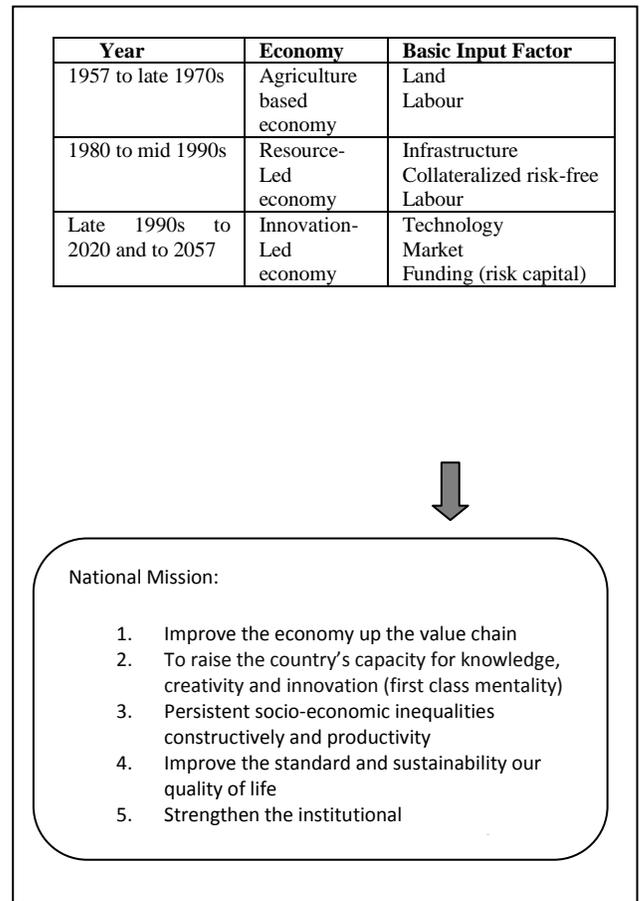


Figure 3: Economy growth and National Mission

Malaysia needs to be highlighted in high quality investment in R&D to be sure that the innovation is going smoothly and fully utilized in the figure 3. The real expertise and specialist have huge responsibilities to get the proper innovation model for industries in Malaysia. From the GDP growth, Malaysia still needs a lot of improvement to be in the same level throughout developing countries.

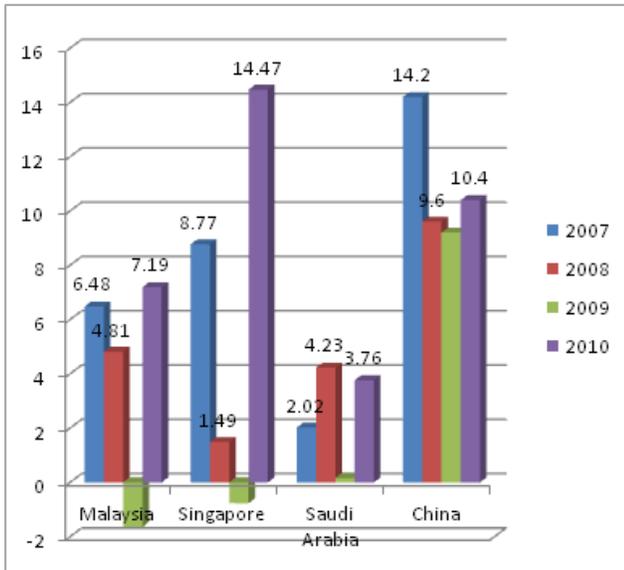


Figure 4: GDP growth in Asian Country

GDP is important to be concerned by country to set the plan. Based on the figure 4, Malaysia is in the middle on developing the GDP with the percentage of 7.19% in the 2010 compare to Singapore that have a great GDP with the 14.47% in 2010. While Saudi Arabia gets 3.76% and China presents 10.4% of GDP in 2010.

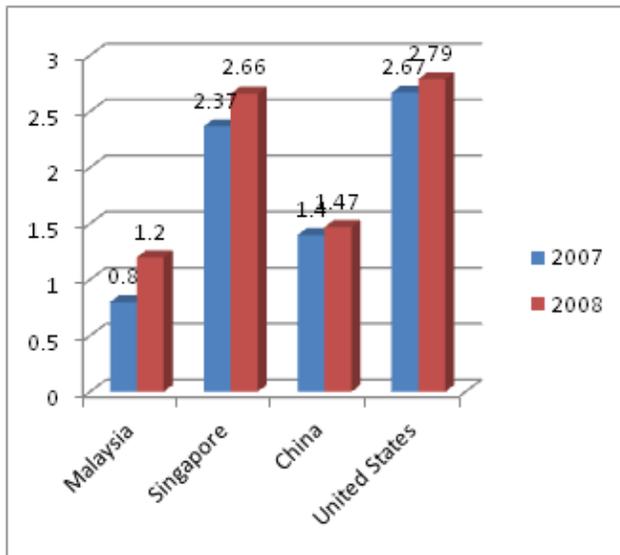


Figure 5: Research and Development Expenditure in Asian Country & USA

Promoting greater incentives for both firms and employees to invest and engage in research and development (R&D) activities, it is necessary to recommend for a broad reduction in labour market rigidities with a greater emphasis on R&D and knowledge intensive sector. According to the figure 5, Malaysia is improving their R&D expenditure with the 1.2% in 2008

compared to 0.8% in 2007. However, Malaysia still has to compete with the strong rivals like USA, Singapore, and China. These countries had developed a stable R&D expenditure in their country. For example, USA had 2.79% of R&D expenditure in 2008, Singapore 2.66% and China with 1.47%.

More specifically in R&D, it involves tackling existing labour market distortions in terms of firing cost. Empirical literature shows that Malaysia has a high level of firing regulation rigidities and redundancy cost, on average, above that of its peer economies in the East Asia Pacific and OECD region [10]. Given the higher labour cost confronted by firms, these are likely to create impact on wages offered and therefore reduce the incentive in hiring highly-salaried knowledge and R&D workers. In such instance, a reduction in redundancy cost, particularly with greater emphasis on the R&D sector, will likely improve the wage incentive for knowledge workers. A policy of minimum wages will not be helpful in this implication, since such policy will further equalize the wage differentials between high-skilled and low-skilled workers, leading to lower incentive to participate in R&D activities [1].

A. Malaysia Green Technology Policy

According to Ministry Energy, Green Technology and Water, the green technology shall be a driver to accelerate the national economy and promote sustainable development among industrial in the country. On the 17th December 2009, the Prime Minister, Y.A.B Datuk Sri Najib Tun Razak has announced in Copenhagen that Malaysia is adopting an indicator of a voluntary reduction of up to 40% in terms of emission intensity of GDP by the year 2020 compared to 2005 levels. This indicator is conditional on receiving the transfer of technology and finance of adequate and correspond to what is required in order to achieve the indicator that has been set for the policy. This policy has been created to get the potential growth on the innovation development and sustainability of green technology in our country as shown in the table 4.

Table 4: Malaysia Green Technology Policy. Sources: Ministry Energy, Green Technology and Water, 2011

Policy	Potential Growth
Energy	Seek to attain energy independence and promote efficient utilisation.
Environment	Converse & minimise the impact of environment.
Economy	Enhance the national economic development through the use of technology.
Social	Improve the quality of life for all.

Sustainable of green technology development in Malaysia needs a strong innovation model to compete with other developing countries. According to the table 4, there are four policies that have been produced by Malaysian Government to help the society towards green country. The policies are energy, environment, economy and social.

The government has spent some budget on giving the green technology financing scheme to the entrepreneur and industries to produce great innovation technology and great green technology as well. In that case, government has improved the innovation development on the three factors that give huge impact to the country. The first factor is research and development (R&D). Malaysia needs to be strong in the research development in a way to have a strong and sustainable green technology in the country. Second, they must also focus on the innovation knowledge and increase the expertise in the specific area like expertise in green technology.

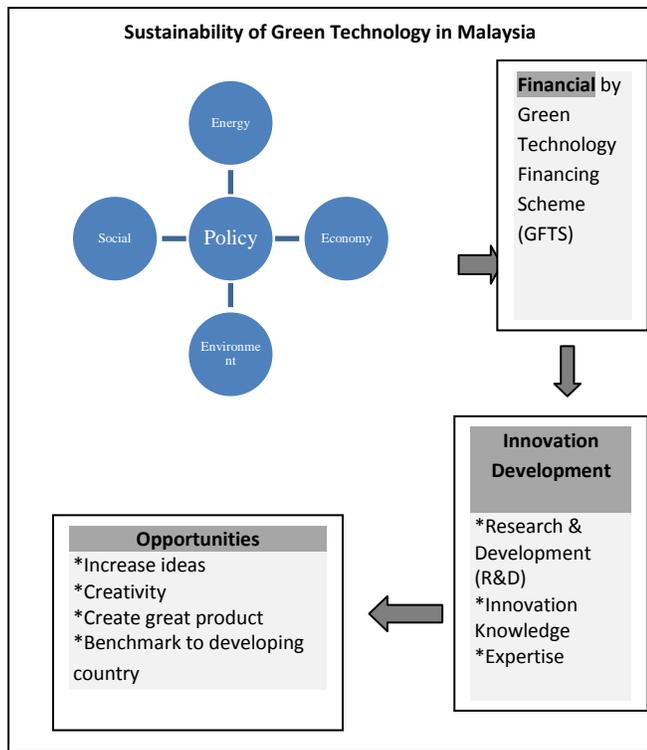


Figure 6: Government Policy towards Green Technology

Sustainability of green technology in Malaysia industry must have a strong support by the government to fulfil the demand of society and the entire world. As supported by the figure 6 shows that the policy by Malaysian government plays a major role on sustaining the development of green technology.

V. CONCLUSION

As conclusion, industries in Malaysia are still on the right track on developing green technology in Malaysia compared to other developing countries. However, it will take time to sustain in this country. Malaysian Government is really focusing on the development of green technology in Malaysia. The responsibility to advocate the green technology in the country is the Ministry of Energy, Green

Technology and Water of Malaysia. When the government has announced the policy for development of green technology, they constantly introduced the programs and gave the incentive for the innovation that happened in Malaysia industries. The establishment of incentive and budget of green technology helps the innovator to produce and create great green technology and can be fully utilized by the nation. The strong support from the government enhances the development of green technology in Malaysia. From the finding of the study, it is recommended to the industry in Malaysia to work more on specific areas and set a benchmark from the other countries to be followed or above than that. Employees must have a clear understanding towards the green technology policy and well use with the innovation model. Based on that, they will be able to fully utilize the manpower, machine, technology and also the budget that government has spent.

Malaysia also needs to improve the innovation model for certain justifications to compete with other developing countries. With certain justification, Malaysia will have bigger chances to sustain in the green technology for a long time. Justifications can be made from the expertise or manpower, on the utilities of technology and the knowledge in innovation management. The authors suggest that more empirical studies on the green technology issues should be carried out to determine whether Malaysia is ready to adopt and adapt the green technology and accept the changes that happen in the economy or society in their country.

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