

Industrial Development in Malaysia Transition for Sustainability

Transisi untuk Kelestarian Pembangunan Industri di Malaysia

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Abstract

Industrial development in Malaysia can be traced back to the early 20th century. The early industrial economy was of a special type based on the commercial production of industrial raw materials. The development of the manufacturing industry in Peninsula Malaysia or Malaya, then, started at the small scale fulfilling the needs of local consumption. The focus of Malaysia's industries during that period up until the independence was on producing rubber, tin, timber and palm oil. Well planned and structured industrialization processes in Malaysia started after Independence in 1957 and during the Second Malaya Plan of 1961 to 1965, industrial activities have diversified to reduce dependency on agricultural and natural resources based industries. This paper highlights the changes of industrialization in Malaysia from natural resources based to the technological and services oriented industries. The changes of industries resources supply source especially by manufacturing industries were discussed. At the early stages of industrial development, industries utilise more on domestic resources and later it become dependent on both foreign and domestic resources. The negative impact on the ecosystem and human health needs to be address and action which will make the industry activities becoming more ecosystem friendly and reduce human health impact will be discussed. Towards achieving sustainability, industry must take an action which balance the need of economic growth while maintaining the health of the ecosystem as well as supporting the need for society.

Keywords

Industry, development, transition, sustainability

Abstrak

Pembangunan perindustrian di Malaysia dapat dikesan kembali pada awal abad ke-20. Ekonomi awalnya adalah satu jenis perindustrian khas berdasarkan kepada pengeluaran komersial bahan mentah industri. Pembangunan industri pembuatan di Semenanjung Malaysia atau Tanah Melayu, telah bermula pada skala kecil untuk memenuhi keperluan penggunaan tempatan. Tumpuan industri Malaysia dalam tempoh itu sehingga kemerdekaan adalah untuk menghasilkan getah, bijih timah, kayu dan minyak sawit. Proses perindustrian terancang dan berstruktur

di Malaysia bermula selepas kemerdekaan pada tahun 1957 dan dalam tempoh Rancangan Malaya Kedua tahun 1961 hingga 1965, aktiviti perindustrian telah dipelbagaikan untuk mengurangkan pergantungan kepada sumber pertanian dan semula jadi berasaskan industri. Artikel ini membincangkan perubahan perindustrian di Malaysia daripada sumber semula jadi berdasarkan kepada industri teknologi dan perkhidmatan yang berorientasi. Perubahan industri sumber bekalan terutamanya dalam industri pembuatan telah dibincangkan dalam penulisan ini. Kesan negatif ke atas ekosistem dan kesihatan manusia perlu diberi perhatian dalam memastikan aktiviti-aktiviti industri menjadi ekosistem yang lebih mesra dan mengurangkan kesan kesihatan manusia turut dibincang. Bagi mencapai kemampanan, industri mesti mengambil tindakan yang mengimbangi keperluan pertumbuhan ekonomi di samping mengekalkan kesihatan ekosistem dan menyokong keperluan untuk masyarakat.

Kata kunci

Industri, pembangunan, peralihan, kemampanan

Introduction

Industrial revolution in 17th century with innovation and technology development to produce product in mass volume trigger rapid industrial development for the past four century. The technology innovation and development especially to industrial need drive the development process in the world. However the industrialization and development growth come with a price. The positive impact shown by increasing economy of a nation, better infrastructure and services as well as better quality of social development. Nevertheless the industrial development has also resulted to negative impact to the environment, human health and social condition. The level of impacts and the period of time differ for many countries. This is due to the different level and period of time for the industrial development in many countries in the world. Most of the European and North American countries start early, where industrial development become important economic activity in the late 17th century. While other parts of the world such as Asia, the modern industrial development starts at the end of 19th century, with Japan and China as the main player.

The industrial development in the world has made changes to many aspects of the environment and human way of life which include quality of life, culture, economy and social condition. Industrialization process at the early stages of development and activities has been found as separate entity from natural ecosystem and its function. However since utilization of natural resources has a direct effect, there are movement to ensure that the industrial activities and its development process resulted to minimum negative impact. Although the ideas to reduce pollution from industrialisation has been seen as too late, (more than 200 years late), it is important to make the changes to reduce polluting practice. The need for transition of industrial development from

polluting activities towards more environment and human health friendly has been develop, theoretically and in practical. This transition ideas such as the development of concept such as sustainable development, industrial ecology, cleaner production, cleaner technology and the latest green growth, will drive the transition towards making industries and its activity as a second nature activity. With such concept in place, it would create technology development, innovation, human skills and opportunity to ensure the transition towards sustainability could be achieve. Innovation and technology development done through a systematic innovation approach would help the transition process to ensure sustainability (Wieczorek & Berkhout, 2009). The need to change the industrial activities and development reduce their negative impact to the environment and human health and making the industries one of the ecosystems which provide function to reduce negative impact. For example the recovery of waste for resources by the industries mimics the function of a natural ecosystem which will reduce flow of waste to the environment. Here application of ecosystem approach emphasize the efficient flow of materials and cycle of waste in the industrial ecosystem, and able to create alternative resources and economic opportunities (Harper and Graedel, 2004; Fariz, 2002, Fariz et al., 2011). The innovation and technology development become important process and tools for the transition for sustainability.

The transition would need many inputs and support from the key stakeholders. There is a need for government, business, industries and consumers to play a critical role to make sure the industrial transition towards a second nature process conducted in a smooth manner. In which the transition process will at least uphold the function and services of natural ecosystem. Hence in addition to technological, knowledge and human skills, the transition process will require effective policy, legislative and strategic plans and implementation programs by the governments, business and industries.

This paper highlights the changes of industrialization in Malaysia from natural resources based to the technological and services oriented industries. The transition through changes of industries resources supply source especially by manufacturing industries was discussed. At the early stages of industrial development, industries utilize more on domestic resources and later it become dependent on both foreign and domestic resources. As industry becomes an important source of economic growth for Malaysia, (which drive the enhancement of quality of life), the industrial activities have a significant impact on the ecosystem health and natural resources utilization trends. The negative impact on the ecosystem and human health need to be address and action which will make the industry activities becoming more ecosystem friendly and reduce human health impact will be discuss. Towards achieving sustainability, industry must take an action which try balance the need of economic growth while maintaining the health of the ecosystem as well as supporting the need for society. Hence government of Malaysia has embarked on many initiatives through its National Environment Policy, Green Technology Policy, Low Carbon City Framework and implementation of Green Growth to achieve sustainable development and to ensure its industrial sustainability in the future.

Industrial development in Malaysia: from British rule to current position

Malaya under the British administration prioritizes industrial activities based on natural resources. During the early 20th century agriculture, mining and timber was the main economic contributor. Many industries establishment during the early 20th century focus on first level of production changing natural resources to raw materials or low technology products. This includes producing sawn wood from timber, tin ingots from tin, rubber latex, palm oil, furniture, textiles and domestic appliances products. These industries activities development growth was accelerated with the development of railway infrastructure in Malaya. The first railway line in Malaya was constructed in 1885. The 12.8 km railway line connects Taiping to Port Weld (Kuala Sepetang). It serve as transportation line for tin mine in Larut. The train service commences from 1st February 1885 and lasted until 1941. Later more railway line has been built and as of 1940 it has connecting most of the major city in Malaya. In addition to the railway line, the power infrastructure and telecommunication infrastructure which follow the railway line development also play important role of industrial development in Malaya before the independence.

Early industrial economy in Malaya was of a special type based on the commercial production of industrial raw materials. For example tin mining industries produce ingots which were use domestically or export. However domestic industry use tin ingots for low value products such as can for packaging of products such as foods and beverages. The development of manufacturing industry in Malaysia (Peninsula Malaysia or Malaya) starts with a small scale industry fulfilling the needs of local consumption. This industry includes textiles, furniture, and food and beverages industry. The production rate depends on available local resources such as timber for furniture industries. These types of industry continue to produce products to fulfill the demand of local consumption until after the World War 2 ends. After the war, the International Bank Reconstruction Development (IRBD) plan, start from 1945 to 1955, focuses on development on socio-economy of country and to promote export oriented industry. The focus of Malaysian industry during that period until the independence was on producing rubber, tin, timber and palm oil. Well plan and structured industrialization process in Malaysia starts after the independence in 1957. This was stated in the First Malaya Plan 1956 to 1960, which has driven the initial industrialization process in Malaysia, created more manufacturing industry which focus on tin, rubber and palm oil industry. During Second Malaya Plan 1961 to 1965, industrial activity has been diversified to reduced dependency on agricultural and natural resources based industry. Diversification an industry goes beyond the existing natural resource based industry. Here new industries emerge especially the petroleum base, electrical and electronic products, construction materials, foreign investors also started to come into the picture of Malaysia industrial development. Matsushita Group of Companies or MELCOM for example, starts its operation for home electrical appliances in 1965. MELCOM or now PANASONIC operated its first factory in Shah Alam, Selangor. Expansion of industries

for more export oriented products has lead to increasing demand of more non-renewable resources. However with expansion of industrialisation, more resources needed hence the local produce resources not enough to accommodate the demand. During the period of 1970 onward, the need for resources from foreign countries increased. Hence more resources were imported from other countries mainly neighbouring countries such as Indonesia, Thailand and Philippines.

The introduction of value added industry has resulted with manufacturing industry increases its gross domestic product (GDP) contribution from 8% in 1957 to 12% in 1969. With the introduction of Free Trade Zones in 1971, growth in the manufacturing sector accelerated, where the manufacturing sector contributed 13.9% to GDP in Malaysia, and in 1990 it had doubled to 27.0%. In addition to the existing industries, movement towards producing high values products was given priorities. Motoring, components for high technology industries, ICT (information and communication technology) and services industries were examples of new high values industries. This dramatic transformation occurred over a period of two decades, and industrial sector has fulfilled its responsibility as one of the engine for economic growth for Malaysia and to achieve the objectives of the New Economic Policy, which has increased employment, increased income and restructured the society. Malaysia has a vision to be an industrialized country by the year 2020. To achieve this vision, manufacturing industry will play a vital role. The Industrial Master Plan (IMP) and its revision, The Second Industrial Master Plan (IMP2) commissioned in March 1995, guide the development of the manufacturing industry in Malaysia. The rapid growth of industries in Malaysia especially from early 1980's, was driven by many factors. One of the key drivers is the WAWASAN 2020 policy which strives to make Malaysia as develop countries by year 2020. With this policy in place and industries as a major player for economic growth and to achieve the WAWASAN 2020 targets, setup of infrastructure such transportation, telecommunication, energy and water have been rigorously established. Moreover with financial support and development of skilled human resources, the changes of industrial development and its activities have been found significant for Malaysia economic growth.

Implication of industrial development to the ecosystem health

The development of the manufacturing industries has had many positive impacts on the economic well-being of the residents through the creation of increased job opportunities for local communities, improved infrastructure and through making modern housing widely available. Additional with policy and incentives by the Federal and State governments, manufacturing industries in the future will become the main engine for economic growth for Malaysia. Nevertheless, it has had undesirable impacts related to the health of the ecosystem and the quality of the living environment. Since industrial development requires changes of the physical environment areas, it will create ecosystem stress. Jamaluddin, (1999) stated that industrial development causes

habitat loss and crated disturbance and stress to the natural ecosystems as well as the man made ecosystems. This disturbance includes environmental quality degradation through loss of aesthetic value, air and water pollution, waste and hazardous toxic waste and other environmental problems.

Moreover development of manufacturing industries had resulted in the clearance of large tracts of land originally under plantation crops, secondary forest and other vegetation. This has created exposed land areas from which soil erodes and enters river systems as sediment. High sediment loads are prevalent in an area that are rapidly developing and is the predominant cause of river pollution in Malaysia. Suspended sediments change the ecological characteristics of the river and limit its value as habitat for aquatic life. Land cleared for industrial estates are more often than not located close to river systems.

In addition to increased sediment load, many rivers have been affected by the discharge of polluting effluent from the industrial activity. Taking examples of the Langat River in The Langat Basin ecosystem, the impact of pollution release, part of the river crossing the industrial areas, its pollution status had been downgraded from “polluted” (Class II rivers) to “highly polluted” (Class III rivers). These highly polluted rivers were found in the developed areas of the Basin ecosystem. The frequent closure of water treatment plants along the Langat Rivers in the Basin in 1998 was a reflection of the “highly polluted” status of the river. Two water treatment plants were shut down due to high ammoniacal content. River water quality fell to the extent that water from the rivers was no longer suitable for extraction and processing to supply potable water. The inability of the river to supply water for processing for potable water suggests poor ecosystem health.

The success of manufacturing industry development in the Basin has also meant that waste generation by industries had increased both in their types and quantities. With current practice of end-of-pipe where large volume waste were dispose directly to landfill. Poor compliance rates by the food, textiles, paper, electrical and metal-based industries indicate that much of their wastes are discharged into the environment and threatens ecosystem health. In addition the practice of illegal dumping of industrial wastes has affected negatively to environment quality and human health. Cases of illegal dumping of hazardous wastes and materials from industries in Malaysia has been recorded and numbers of it have been taken to court for legal action. Table 1 listed example of illegal dumping cases involving hazardous wastes and materials in Malaysia.

There are also possibilities that industrial estates areas become contaminated lands. The Department of Environment of Selangor for example, in 1996 has made report, that a factory located in the Langat Basin has been found disposing hazardous waste into the ground at the back of the factories. Ground water testing was conducted and this case has been taken to the court. Although the process of proving will take time, but what exactly happen is that the industrial estates in the basin have high possibilities to become contaminated land, which might contaminate the ground water. This later

Table 1 Reported incidents of illegal hazardous wastes and materials dumping in Malaysia

Year	Location	Amount and Type of Wastes / Materials	Company
1989	Pantai Remis, Perak	1,500 tonnes of toxic wastes	Unknown
1993	Bukit Merah, Perak	Radio active wastes	Asian Rare Earth Plant, Mitsubishi Kasei.
1995	Pangkor Island, Perak	Forty-one drums of highly toxic potassium cyanide	Unknown
1995	Penang Island	28 drums of trichlorofluoromethane	unknown
2001	Ulu Tiram, Johor	1,000 tonnes of metal ashes	Foreign-based smelting company
2003	Ijok, Selangor	500 drums of paint sludge and glue.	Unknown

Source: Recycling Point Dot Com (2003), The Star, (2003)

will create many environmental issues as the land might become hazardous for human and natural process, as well economic debacle in the future.

The process of industrial development and its activities must be fully understood in order to make its as one of the component of ecosystem. The full function of industries should not be focus on economic purposes; their function should go beyond this. With advancement of technology, industries able to be transform as one of the key component of the bigger natural ecosystem. Industries must play a part to ensure that negative impact to the environment and human health are manageable.

Industrial transition for sustainability

Acknowledge the need for changes, the transition process in Malaysia could be traced back in the early 1970's especially when the EQA 1974 was gazetted. Malaysian government initiatives for environmental protection from industrial activities begin with these legal instruments. The plan is to control pollution intensities generated by industries in Malaysia. This step has become an initial drive to ensure the transition of industrial development and activities in Malaysia will achieve its second nature stages, where industries able to provide several function as a natural ecosystem such as cycle of resources and waste in the industrial ecosystem to reduce pollution intensities.

It should be proud that the Malaysian Government are up to date with current global movement for environmental protection and still focus on the need for sustainable development. Malaysia initiatives and program towards green growth could be trace back since early 1970's. Although at the early stages the initiatives were more on protection on environment from development and industrialization. However its effect has promoted more environmental protection or conservation initiatives which become part of parcel towards achieving sustainability. Here the establishment of the Environmental Quality Act (EQA) 1974 and establishment of Department of Environment (DoE) Malaysia as the agency responsible to enforcement EQA 1974 shows Malaysian government commitment. The role of EQA 1974 and DoE was to

monitor, enforce and educate for pollution control and management by the development processes for all economic activities mainly manufacturing industries, petroleum, construction, mining and agriculture.

The commitment of Malaysia government on environmental protection and conservation was shown when Malaysian sends very strong delegates attending the Rio Conference on Sustainable Development, 1992. Malaysia delegates were headed by the then Prime Minister, Tun Dr. Mahathir Mohamed. Back from Rio, Malaysian government starts its initiatives for sustainable development. Table 2 shows some of the initiatives done by the Ministries and agencies towards ensuring industrial sector to become more environmental friendly. While Figure 1 shows the timeline of changes towards sustainable development using the green growth approach.

Malaysia has embarked on green growth as the main approach to achieve sustainable development. Green growth approach will drive the transition of industrial activities and development towards sustainability. This approach will help to spurs the ideas that industries are able to provide several function of natural ecosystem. The green growth has two key components, green technology and green economy. Green Technology definition by Ministry of Energy, Green Technology and Water, Malaysia:

Green Technology is the development and application of products, equipment and systems used to conserve the natural environment and resources, which minimises and reduces the negative impact of human activities.

Basically Green Technology refers to products, equipment or systems which satisfy the following criteria:

1. It minimizes the degradation of the environment;
2. It has zero or low green house gas (GHG) emission
3. It is safe for use and promotes healthy and improved environment for all forms of life;
4. It conserves the use of energy and natural resources; and
5. It promotes the use of renewable resources.

However there are other components which also play an important role for green growth. This includes green growth policy, green legislation and green culture.

Fostering green technology and green economy for green growth in Malaysia

Although the concept of green growth has been identified to drive industrial activity in Malaysia achieve sustainable development in the future. The process must be driven by a specific policy. Policy is an important document and statement to ensure green technology and green economy were established and developed to achieve green growth in Malaysia. Here the Malaysia National Green Technology Policy established

Table 2 Green initiatives by Ministries and Agencies

Initiatives	Ministry/ Agency	Year
Promotion of EMS	Ministry of Science, Technology and Environment, SIRIM, DoE	1995
Promotion of cleaner production	Ministry of Science, Technology and Environment, SIRIM, DoE	1995
Promotion of waste minimization and recycling	Ministry of Housing and Local Government, Department of Local Government, DoE, SIRIM	1995
Promotion of schedule waste recovery	Ministry of the Natural Resource and Environment, DoE, Ministry of International Trade and Industry, SIRIM	2005
Promotion and enforcement of domestic waste recycling	Ministry of Housing and Local Government, Department of Solid Waste Management, National Solid Waste Management Corporation, PN, DoE, SIRIM	2007
Biofuel Promotion	Ministry of Energy, Green Technology and Water	2007
Green Technology and Green Economy	Ministry of Energy, Green Technology and Water	2009
Economic Transformation Program (ETP)	Prime Minister’s Department	2009
Low Carbon City Framework	Ministry of Energy, Green Technology and Water	2011

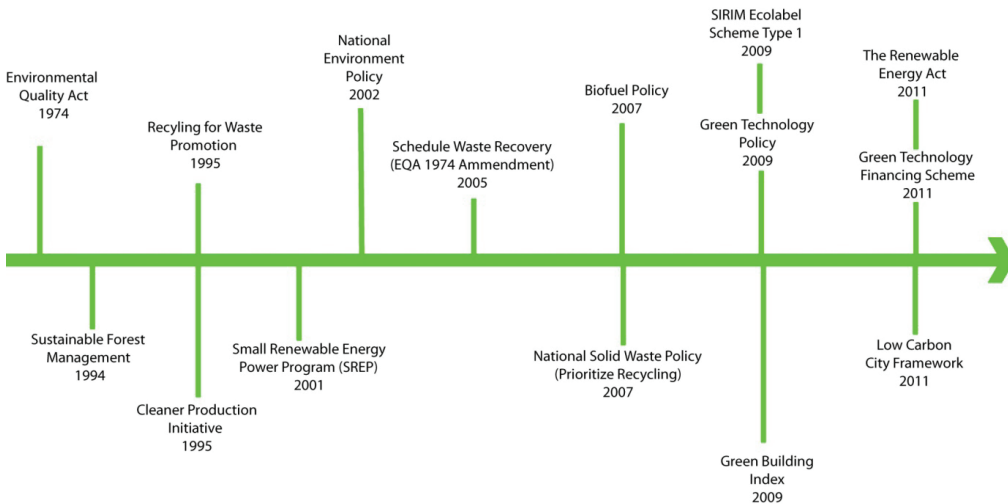


Figure 1 Timeline of green initiative and policy for green growth in Malaysia

in 2009 is an important document. Green Technology shall be a driver to accelerate the national economy and promote sustainable development. The policy has five objectives as listed below:

1. To reduce the energy usage rate at the same time increase economic growth.
2. Facilitate the growth of the GT industry and enhance its contribution to the national economy.
3. Increase national capability and capacity for innovation in GT development and enhance Malaysia competitiveness in GT in the global arena.
4. Ensure sustainability development and conserve the environment for future generation and;
5. Enhance public education and awareness in GT and encourage its widespread use.

The policy has four pillars which uphold the needs for sustainable development. The four pillars are:

1. Energy: Seek to attain energy independence and promote efficient utilization;
2. Environment: Conserve and minimize the impact on the environment;
3. Economy: Enhance the national economic development through the use of technology; and
4. Social: Improve the quality of life for all.

Implementing the policy will require strategic and effective institutional structure and mechanisms. Here the structures must includes not only the government agencies

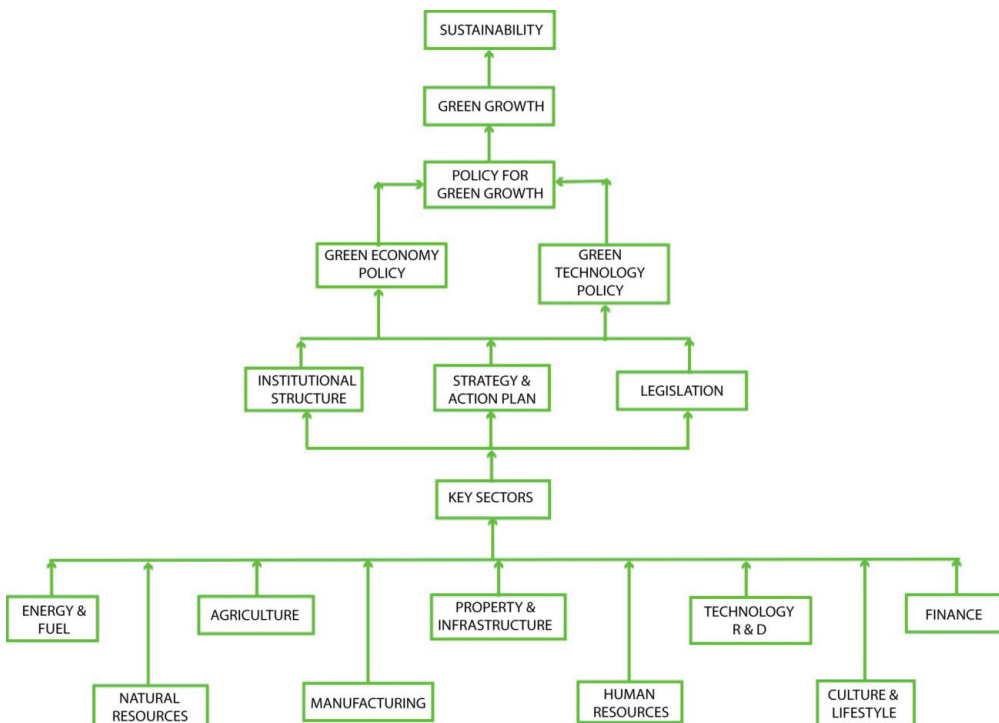


Figure 2 Green growth framework for Malaysia

but must also includes the business, industries and communities. The non-government entity participation should be made available at key level of decision making process. Their roles and responsibilities must be clear and must set targets to ensure the policy objectives will be achieve within the time frame given. Figure 2 illustrated the green growth framework suitable for Malaysian needs.

The framework would ensure that any initiatives designed or conducted will achieve the policy objectives targets. Currently there are many green growth initiatives has been implemented in Malaysia. Table 3 shows initiatives which have been done and on-going.

Table 3 Green growth initiatives in Malaysia

Sector	Initiative
Energy	Biofuel – palm oil, Solar power R&D – wind power,
Waste	Waste to energy Recovery for recycling – alternative resource. Reduce landfill needs
Manufacturing	Green productivity – resource efficiency, design for environment, alternative resource, energy efficiency
Agriculture	Waste to energy – palm oil plantation Rice husk – R&D stage

The challenges for industrial transition for sustainability in Malaysia

There is a need to determine industrial function and services beyond economic needs. What are the best and effective functions and services industries could produce and help to maintain natural ecosystem function. With rapid technology development and advancement, industries able to choose which function and services they think suitable for their industries. Example like recovery of waste, solid or hazardous and use them as resources, help to minimize impact to the environment and human health and create new alternative resources. Recovery of industrial waste will create alternative resources and promote costs efficiency (Jo Dewulf and Langenhove, 2005). Application of design for environment approach will help to reduce consumption of non-renewable resources and generation of wastes while increases recycling potential. Hence prioritizing the need for the natural ecosystem while maintaining the industrial process and profit will be the ingredients of green growth success.

Therefore application of green growth concept will help to drive the industrial transition in Malaysia from first nature to second nature. However the challenges of green growth implementation are many. There is a need to understand the interaction of key factors which affect green growth. For example key factors for the interaction and process between technology development, industrial needs and the process to reduce negative impact to the environment must be determine at all level. This level includes

from design of products, choosing resources, identification of market, compliance to legislation requirements, industrial standards and other process which will make industrial process and its products able to be part of the natural ecosystem function, while maintaining its sustainability. Hence there is a need to determine their input, the mechanisms, output and impact of each factor. The paradigm shift processes must take place and the key stakeholders mainly by the government agencies, business, industry and community must show their highest possible commitment.

Conclusion

The development of industry in Malaysia has been found affecting negatively to the ecosystem function and environmental quality as well as human health. Mass consumption of natural resources by the industry has a direct impact on environment. As more resources needed, mass harvesting of natural resources increases and more land were utilized for production of industrial resources such as mining for tin, conversion of forest for palm oil and logging for timber. Land clearing for development of industrial park also led to more degradation of ecosystem function. In addition industrial activity has been reported increasingly generated pollutants to the environment. Water, air, soil and groundwater pollution disrupted the ecosystem function such as providing clean water, clean river, clean air and fertile soil. Increasing pollution intensity also impacted on human health. Cases such as illegal dumping of industrial radioactive waste in Bukit Merah, Perak has lead to negative impact on the environment and human health. However there are changes made towards making industry to be more responsible with their action, especially in controlling pollutant generations and release to the ecosystem. Initiatives of industry towards responsibility on environmental protection and environmental friendly products could be traced back during the oil crisis in the 1970's. Due to the need to ensure resource efficiency, the green production or greening the industry revolution was established during that time. Rapid technology development allows more innovation to ensure industrial activity to be more environmental friendly. Currently there are many technology and knowhow to increase resources efficiency and development of alternative resources for industrial demand. This technology would enable industry to reduce dependency on natural resources and use more alternative resources such recyclable resources. In Malaysia, approach towards establishing clean industry has been introduced in late 1980's. Back by the legal and economic strategy, promotion of cleaner technology for cleaner production now becomes an important approach taken up by industry in Malaysia. Malaysia has embarked to implement green growth for its future economic and development. With policies such as the National Green Technology Policy and the National Environment policy, the industrial development in Malaysia is expected to drive Malaysia green growth targets and meet its sustainable development objective.

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