Malaysia Industrial Master Plans (IMPs) and the Focus on the Nation Technology and Innovation Development

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Abstract
The global and domestic challenges that confront the Malaysia industrial sector nowadays, had made Malaysia learnt that the past industrial approaches based on heavy dependence of large-scale injection of foreign capital to boost labor productivity are no longer viable. The Malaysia’s industrial plan on heavy reliance to foreign direct investments (FDIs) for the industrial and technological development faced major threat. Prior to 1986 and the three decades onward, the three Malaysia Industrial Master Plans (IMP1, IMP2 and IMP3) policies were adjusted to focus on total productivity growth, which requires strong synergy among all factors of technology and innovation system. This study highlighted on the specific focus of each of the three Malaysia’s Industrial Master Plans (IMPs) and to relate these focus on the technology and innovation used to increase productivity at the time. The essence of the new growth strategy was a shift from assembly-intensive manufacturing technology to an integrated and innovative value-added, industry-wide approach encompassing both manufacturing and related services. The purpose of this study is to establish the importance of technology and innovation in Malaysia Industry and relate to the vital need of STI Policy to align back with Malaysia’s Industrial Master Plan, to drive export competitiveness for realization of the nation’s industrial development agenda. In conclusion, the two vital policies, which are the Industrial Master Plan Polices and Science, Technology and Innovation (STI) Policy need to move forward together, aligned and support each other, in order to ensure effective and strategic development of Malaysia industry.

Keywords: Science, Technology and Innovation; Industrial Master Plan; Competitiveness; export

1.0 INTRODUCTION
Malaysia’s industrial competitive strength has been built upon relatively low labor cost, fairly educated workforce, availability of support services, sound physical and policy infrastructure, and spearheaded by foreign direct investment, FDI for the last three decades (1986-2018) (MITI, 2018). To date, Malaysia’s manufacturing industry profiles are divided into thirteen (13) different industries, namely Chemical and Petrochemical Industry, Automotive Industry, Wood Based Industry, Textile Apparel and Footwear Industry, Rubber Industry, Electrical and Electronics Industry, Machinery and Equipment Industry, Aerospace Industry, Iron Steel Industry, Cement Industry, Food Industry, Medical Devices Industry and Pharmaceutical Industry, whilst services industry are divided into twelve (12) sectors: business, communication, construction and related engineering, distribution, education, environment, healthcare, tourism and transport (MITI, 2018).
In this time, the Malaysia’s industries were shaped, structured and directed according to three National Industrial Master Plans (IMPs). Industrial Master Plan 1 (IMP1, 1986-1995) laid the foundation of manufacturing industries and promoted the processing of natural resources instead of exporting them in raw form. Industrial Master Plan 2 (IMP2, 1996-2005) tried to broaden manufacturing capability through the strategies of cluster-based industrial development and manufacturing plus plus. Industrial Master Plan 3 (IMP3, 2006-2020), which is currently in progress, is focusing on further broadening the industry scope by including services and featuring functional targets such as SMEs, Human Resources Development, technology, logistics, marketing, and so on (MITI, 2008). Basically, Malaysian industries practice a low skilled intensity, while retaining value-added which accounted for the phenomenal growth in exports and employment (Kanapathy, 2001).

However, the global and domestic environment is changing rapidly, thus, calling for different set of strategies to build new sources of industry’s competitive advantage. Domestically, Malaysia has a weak point based on its small population base (31million population), meanwhile at the international environment, Malaysian industry now has to compete with lower-wage newcomers such as China, India, Vietnam and Thailand, where many of which have large domestic markets than Malaysia and are aggressively promoting themselves as low-cost export platforms (Economic Report 2013/2014). Not only does Malaysia have to compete with the lower-wage newcomers to attract FDI, but investments are also increasingly flows to the four Asian Tigers (Hong Kong, Singapore, South Korea and Taiwan) since the mids-1980s (Bursa Malaysia, 2018).

Advancements in technology, business processes and ideas afforded by innovation will enhance the country’s competitiveness, productivity and economic growth. Innovation is a differentiating factor that based according to country’s economy, where on average, innovation performance or output is stronger in high-income countries than in middle- and low-income countries (Global Innovation Index Report, 2018). Thus, it is important to have good National Industrial Policy and also the National Science, Technology, Innovation Policy and Innovation system that will drive profitability and spur long term growth of nation.

This study highlighted on the specific focus of each of the three Malaysia’s Industrial Master Plans (IMPs) and to relate these focus on the technology and innovation used at the time. The purpose of this study is to establish the importance of technology and innovation in Malaysia and relate to the vital need of STI Policy to align back with Malaysia’s Industrial Master, to drive export competitiveness for realization of the nation’s industrial development agenda.

2.0 SPECIFIC FOCUS OF THE 3 IMPS AND TECHNOLOGY AND INNOVATION AT THE TIME

The Malaysia industrial strategy that has been adopted since independence can be classified into six phases (Abdullah, 2012 and MITI, 2006). As summarized in Table 1, it was highlighted that all of the three Malaysia Industrial Master Plans (IMPs) were designed for Phase V, the Second-Phase Export Oriented Industrial Strategy, which focus on encouragement for resource-based manufacturing activities, the linkages, and competitiveness and for becoming success export player in global market.

<table>
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<tr>
<th>Phases</th>
<th>Industrial Strategy</th>
<th>Policy</th>
<th>Objective/ Emphasize</th>
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<td>Phase II (1957-1967)</td>
<td>First-phase Import Substitution Industrial (ISI) strategy</td>
<td>Pioneer Industries Ordinance Act 1958</td>
<td>To diversify the economy, reduce imports and generate employment.</td>
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<tr>
<td>Phase III (1968-1980)</td>
<td>First-phase Export Oriented Industrial (EOI) strategy</td>
<td>-Investment Incentives Act 1968 -Industrial Coordination Act</td>
<td>To diversify the manufacturing sector (electronics and textiles for export), create linkages and employment.</td>
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Table 1: Malaysia Industry Strategy
(Abdullah, 2012 and MITI, 2006)
Free Trade Zone Phase IV (1981 onward)
- Second-phase Import Substitution Industrial (ISI) strategy
- Heavy Industrial Policy 1981
- Look East Policy 1981
To create linkages in the manufacturing industry. To reduce imports of intermediate and capital goods

Free Trade Zone Phase V (1986 onward)
- Second-phase Export Oriented Industrial (EOI) strategy
- IMP1 (1986-1995)
- IMP2 (1996-2005)
- IMP 3 (2006-2020)
To increase manufacturing linkages and competitive - Resource industries and encouragement for exports.

Knowledge economy Phase VI (1990s onward)
- Multimedia Super Corridor (MSC)
To move higher skilled knowledge economy

The first Industrial Master Plan, IMP1 (1986-2005)

The IMP1 laid the specific focus for the manufacturing sector to become leading growth export sector of the economy. Before the establishment of IMP1, technology in Malaysia at that time was concentrated on two major manufacturing industries, namely electronics and electrical (E&E), and textiles. Due to heavy promotion of first-phase export-orientation sector through 1960s by government policies such as Investment Incentives Act 1968, Free Trade Zones Act 1971, and related labour law reforms, Malaysia has been growing rapidly and attracting the export-oriented foreign investment. Investment project and technology transfer agreement must be registered at Technology Transfer Unit in Ministry of Trade and Industry (MITI). Nevertheless, technological development was accorded a relatively low priority, as the concern of the ministry was more on policing restrictive contract terms. Studies of the electronics industry development during 1970s and early 1980s indicate extremely limited technological development with in Multinational Corporation, (MNC) s Malaysian operations, and noted very few spill-overs to the local economy (Jomo and Felker, 2007). As a result, the Malaysian government has come up with new strategy to develop for its second-phase import capabilities through the Heavy Industrial Policy 1981. The government objectives was “inter alia”, included both for the development for locally produced Malaysian goods and promote greater linkages with the player in the domestic economy, especially with Bumiputera enterprises. HICOM was set up to lead technological development by collaborating with foreign firms (especially Japanese and Korean) and investing in local R&D. Heavy tech-industries that have been developed at that time were such as hot briquetted iron and steel billets plant, two more cement plants, the Proton national car project, three motorcycle engine plants, a petroleum refining and petrochemical project, and a pulp and paper mill (Jomo and Felker, 2007).

One of the chief criticisms of heavy industrialization was its disappointing stiff international competition and required heavy protection or otherwise experience little viability e.g for case of steel, cement, petrochemical, shipbuildings and repairs (Jomo, 2007). In fact, the new heavy industries was not strategically linked with rest of economy like agriculture, commodities and tourism (services), thus not potentially advancing nation technology development and industrialization as a whole.

IMP1 was developed to address the weakness on Malaysia’s Industrial sector at that time such as as reliance on foreign semiconductor giants for export and undiversified and unintegrated manufacturing sector. In addition, in 1991, Prime Minister Mahathir Mohamad had emphasized the priority on technology as one of the nine challenges facing by the nation in National ‘Vision 2020’, stated that “There is inadequate development of indigenous technology. There is too little value-added, too much simple assembly and production...” and asserted the goal of creating “an economy that is technologically proficient, fully able to adapt, innovate and invent, that is increasingly technology-intensive, moving in the direction of higher and higher levels of technology.” As a result of the various liberalization efforts by the government in IMP1 especially the 1990 Action Plan for Industrial Technology Development, Malaysia’s industrial base was broadened more “outward-looking” for diverse economy. As evidence, it was proven that manufacturing output rose swiftly, averaging 8.9 per cent in 1980-1990 to 13.2 percent per year in 1990-1995, while Malaysia’s merchandise exports grew from 11.5 percent annually during 1980-90 to 17.8 percent from 1990-95 (Jomo and Felker, 2007). However, IMP1 failed to develop domestic linkages of MNCs with local firms. Malaysia depend mainly on MNCs as main source of technology
spillover, however during IMP1, Malaysia experienced lack of linkages between MNCs and local firms and also local inability to understand fully the operational practices of MNC subsidiaries’ technology. By the end of IMP1 in 1995, Malaysia’s manufacturing sector was still narrowly based and MNCs were still the main source of growth (MITI, 2008)

The second Industrial Master Plan, IMP2 (1996-2005)

The IMP2 was basically a continuation strategy of IMP1, but with the focus on building an integrated industrial linkages and cluster development that encompassed both manufacturing processes and business support services (MITI, 2008). The ideas to enhance capability of industries both horizontally and vertically (including more processes and improving productivity of each process) along the value chain were uniformly applied to eight target industries: E&E, textiles and apparel, chemicals, resource-based industries, food processing, transportation equipment, materials, and machinery and equipment. Positive technology spillovers from the external sector to domestic demand began to materialize in the first half of IMP2. At the time, Malaysian-based subsidiaries especially the electronic components sub-sector, which concentrated in Penang and Kuala Lumpur were upgrading their manufacturing process technology through automation - enabled by accumulation of process engineering capacities and technical and workforce skills (UNPAN, 2001). Intra-firm linkages also been reported as local vendors using more technologically sophisticated machine tools (MITI, 2008). Moreover, electronics sector was seen more targeted for development than semiconductor sector because the positive growth of technologically dynamic linkages with local suppliers of parts and components (Jomo and Felker, 2007). In chemical industry, integration with other manufacturing groups to strengthen industrial linkages and increase its productivity and competitiveness was seen between petroleum and petrochemical, pharmaceutical and fine chemical sectors. Information technology (IT) and multimedia industries were also been initiated through cluster-based development of Multimedia Super Corridor (MSC) in 1996. The significant increase of technology inflow was seen by the variety of channels, especially majority by firm technical assistance, followed by licenses, patents and joint-venture as indicated by higher number of contractual agreements approved by the Government during the IMP2. These contribute to the local productivity and organizational efficiency, at the same time contributed to success of national economic development plan especially in industry of electrical and electronics product, transport equipment and chemicals and chemical products. (Appendix 1)

Despite continuing the sluggish supply-side investment from MNCs for technology spillover reform, the new focus was to create appropriate intra- and inter-firm networks to capture technological externalities. In order to achieve that, the industrial policy was adjusted to develop technology that associated with total factor productivity growth, which requires strong synergy among all factors of production. Knowledge-intensive technology economy, Information Technology Centre (ITC), e-commerce, biotechnology and electronic branding became the emergent technology used at that time.

Though Malaysia placed high reliance for the IMP2 to emulate similar success attempt of Singapore in inducing MNCs globalization strategies for more locally integrated technological production, Malaysia industrial and technology policy was called for policy re-consideration after shocked series of economic downturns associated with the Asian Financial Crisis (1997-98), the global semiconductor recession (around 2001), and the Global Financial Crisis (2008-09). Plus, China (later also Vietnam and India) has risen as the emergence manufacturing competitor and as promising attractor of FDI of the region. As consequences, the internal value creation and the development of industrial clusters were less than IMP2 anticipated, protected automotive sector faced the challenge of globalization in addition to the small domestic market, and foreign giant firms strengthening their dominance in Malaysia’s E&E sector.

The Third Industrial Master Plan (IMP3) (2006-2020)

The Third Industrial Master Plan (IMP3) (2006-2020) shifted Malaysia’s industrial strategy from building linkages around the existing E&E and automotive sectors to the creation of innovative SMEs independent from multinational corporations (MNCs) or government- linked corporations (GLCs). The aim of Malaysia is to achieve global competitiveness through transformation and innovation process of the manufacturing and services sectors by (1) facilitating the development and application of knowledge-intensive technologies, (2) fostering
collaborations among Government research institutes, institutions of higher learning, science and technology parks and industries; (3) promoting research-based industrial cluster development by acquisitions and utilizations through Government established bodies like the Malaysian Technology Development Corporation (MTDC) and Malaysian Venture Capital; and (4) promoting the greater utilization of Information and Communication Technology (ICT) and other technologies along the value chain (MITI, 2006). To transform the country into a service-led economy, Malaysia promoted information technology (IT) and multimedia industries as the new sources of economic growth (MOF, 2014). In 1996 the National Information Technology Agenda was formulated to provide the framework for the coordinated and integrated development of skills and infrastructure, as well as IT-based applications. Strategic roadmaps, policies and commitment through investment and incentives such as establishment of Intellectual Property Corporation of Malaysia (MyIPO) in 2003, Agensi Inovasi Malaysia (AIM) in 2011, Malaysia Global Innovation & Creativity Centre (MAGIC) in 2013, Malaysia Tech Entrepreneurs Programme, Malaysia Digital Hub, Digital Free Trade Zone, Malaysia Digital Economy Corporation (MDEC), and Leap Market help drive this technological inclusiveness and widen the scope for digital technology-related development till today reached an impressive rank level in Asia. According to IMD World Digital Competitiveness 2017, out of 63 countries, Malaysia ranked in 4th place for investment in telecommunications and 4th place for High Tech Exports. As a result, Malaysia attracted Foreign Direct Investment (FDI) from countries such as China (RM63 billion investment) and European Union (RM106 Billion investment) who were interested in forging partnerships in digital, e-commerce and new economy in 2017 (Bursa Malaysia, 2018).

A person cannot live in society with dignity, stability, tranquility, and security unless the five necessities of the Islamic Sharia are attained; which are religion, self, mind, progeny, and property. There are dozens of the Prophet’s traditions (peace be upon him) and actions that urge attention to healthcare, which confirms that the guardians and leaders are obliged to provide healthcare for citizens. According to Akrama Sabri (2015), when the king of Egypt gave a doctor to the Prophet Muhammad (peace be upon him), he instructed the doctor to treat all people without exception and free of charge, and proved that no one paid for the health treatment or medications. In addition to that, Prophet Muhammad (peace be upon him) established a fixed tent in the courtyard of the Prophet’s Mosque for the ummah to get free treatment and injections; a number of Sahaabis had received these health treatments, and the Sahaabiyyats performed the great humanitarian task (Akrama Sabri, 2015).

The development of the healthcare concept for Muslims is due to the directives of the Prophet Muhammad (peace and blessings be upon him); who has motivated the Ummah to seek medicines, he made it clear, that every disease was created with a cure, by saying: " God has sent down a disease and has also to brought down its healing." Saheeh al-Bukhaari. Additionally, Doctors were brought from different countries for the treatment of Muslims, therefore, Muslim scholars such as Al-Biruni, Ibn Sina, Al-Razi and Ibn Rushd learnt medicine and pharmacy, and others collected the Prophetic Traditions related to health and medical subjects in a single book for those who were interested in knowing the views of the Prophet in this particular field. Hospitals were also built in Córdoba and Baghdad since the second century AH, and the leaders ensured the treatment of patients during Ahmed el-Mansour the golden era (1549). Infectious diseases and problems common to a community are discovered, and the program to combat this “condition” were linked to improve public health and regional development (Aziz Ait Al-khawi, 2014).

The caliphs and princes in successive times established hospitals to treat patients and dispense the necessary treatment for men and women without pay regardless of their gender, religion, or social status. Each of these hospitals was divided into two sections: a men’s section and a women's section. These hospitals were furnished with the best furniture and equipped with the best tools, as well as cover, clothing, food and service. They included the most famous Muslim doctors, and were often administered by princes or supervisors to demonstrate the importance of health services, and to ensure the state cared for health affairs (Ragheb Al Sarjani, 2010).

3.0 RESULT AND DISCUSSION

Malaysia is an upper middle income developing country, and on the top of that, the progress of Malaysia’s economy is ahead of its more developed regional peers. This is laid in Malaysia's strength of relatively high proportion of industrial manufacturing sector contribution to the economy compared with other countries which were more value-add services driven. Malaysia ranking 26th out of 80 countries in the 2018 Bloomberg Innovation Index, with scored a total of 64.79 points out of a possible 100. The innovation index rates countries on seven
categories: R&D intensity, manufacturing value added productivity, high-tech density, tertiary efficiency, researcher concentration, and patent activity. Of the seven categories, Malaysia performed best in the area of manufacturing value added, placing 17th courtesy of the country’s industrial background. It fared worst both in productivity and tertiary efficiency, coming 36th for both. This indicates the need to ramp up Malaysian efforts in developing innovation, and research and development (R&D) capabilities to propel to an advanced nation status by 2020.

In addition, Malaysia has been less successful in attracting increasingly advanced technological operations of MNCs, many of which have confined themselves to manufacturing and assembly activities (OECD, 2013). Knowledge spillovers, for example, through backward linkages to domestic firms, have also been limited (Zaidah et al., 2007, Jabar, 2012). Furthermore, Malaysia continues to suffer from a continuing shortage of skilled-labour, which has not been helped by outward mobility of talent to other countries (TalentCorp, 2017).

The technological catch-up strategies in context of Malaysia National Innovation System (MIS) refer to the technological development capabilities of Malaysia firms, especially the Small Medium Enterprises (SMEs), to use resource-based views which pursue strategies at best to exploit its unique resource position. Malaysia adopted Foreign Direct Investment (FDI) leveraging model that used trade and domestic credit policies to emphasize government facilitation of MNC-induced technological learning during the early catching-up period. The first two policies of science and technology policies, The National Science, Technology Policy 1986 (NSTP) and the Second National Science and Technology Policy (NSTP2) (2002–2010) aimed to increase investment in basic research activities to pursue the application pioneering strategies. At the same time, government of Malaysia started to upgrade manufacturing capabilities to manufacture new and advanced science and technological product through IMP1 and IMP2 strategies. The industrial technology grew from simple manufacturing operation in 1970s to high value-added R&D activities since early 1990s (MITI, 2008). Malaysia, then followed and pursued various non-selective functional interventions, from general promotion for both MNCs and local small and medium enterprises to provision of industrial infrastructures and incentives (including general education and training and non-specific incentives for in-firm training and technology diffusion) to develop its innovation strategy and system as illustrated in Appendix 2 (Wong& Goh, 2014, Goedhuys et al, 2015, Akoum, 2016). The current Third National Science, Technology and Innovation Policy, NSTPI (2013–2020) emphasize the generation and utilization of knowledge; talent development; energizing innovation in industry; and improving the governance framework for STI to support innovation. In short, Malaysia had climbed the ladder of innovation mechanisms from responding to local conditions and welfare (such as Universities & Research Institute), to build up innovation capacities (Innovation support infrastructure) and elegantly move toward to build –up niche competitiveness, climb value ladder in global chain and keeping competitiveness in frontier industries, through gearing not only the right and strategic industrial policies and environment , but also supported by STI Polices and Innovation system.

4.0 CONCLUSION

Malaysia needs to adjust to the new great game or challenge of 21st century global competition. Just as Malaysia preceded Knowledge-based economy since 1990s, Malaysia is called to gear up its momentum to increase investment in R&D, education, and other inputs into the innovation system that far more vigorous attention be paid to capturing the outputs of innovation -- the commercial products, the industries, and particularly high-quality jobs to restore full employment. Malaysia’s commitment to overcome middle-income trap depends on succes in the two vital policies to move forward back to back, align and support each other, which are the Industrial Master Plan and STI Policy.

REFERENCES


Adapted from the Eight Malaysian Plan (MP): Science and Technology (UNPAN, 2001)

TECHNOLOGY INFLOWS BY TYPE OF AGREEMENT, 1995-2000 (NUMBER)

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TECHNOLOGY INFLOWS BY INDUSTRY GROUP, 1995-2000 (NUMBER)

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Appendix 2: National Innovation Strategy, Adapted from: Agensi Inovasi Malaysia (AIM), 2012

NATIONAL INNOVATION STRATEGY

- Strengthen the Building Blocks of Innovation
  - Build FutureSkills in the Education System, IHLs, the Private Sector and Government
  - Nurture and Develop Intellectual Capital
  - Creating a seamless funding pipeline for innovation

- Leveraging on Innovation Enablers
  - Utilizing multi-platform ICT technologies to engage the citizens
  - Adopt open innovation collaboration between academia, industry, government and citizens
  - Involve all levels of citizens in the nation’s innovation agenda

- World class innovative nation
  - Develop world-class PRIs and COEs in niche areas
  - Develop global companies with distinctive capabilities through innovation, leading to global penetration
  - Encourage the Rakyat to out-perform themselves