CHARTING THE ECONOMY: REVISITING THE INDUSTRIAL POLICY EXPERIENCE OF MALAYSIA

Rajah Rasiah
Asia-Europe Institute, Universiti Malaya

Rohaya Mohd-Nor
Faculty of Economics and Business, Universiti Malaysia Sarawak

Miao Zhang[♣]
Research School for Southeast Asian Studies, Xiamen University

ABSTRACT

The much-maligned industrial policy approach by mainstream economists got a major push when the United States and European Union began introducing subsidies to support the import-substitution development of micro-chips to offset shortages caused by a fall in imports from China triggered by geopolitical developments since the turn of the millennium. Consequently, it opened the floodgates for the introduction of more assertive interventions through industrial policies. This paper revisits Malaysia's historical experience with industrial policies, and examines its impact on industrialization and the Malaysian economy. In doing so the paper critically assesses the capacity and effectiveness of the New Industrial Policy 4 (NIMP4) in successfully transforming the Malaysian economy from low- and medium-value-added economic activities in 2023 to high value-added economic activities in 2030, so as to support the achievement of progressive wages from a median of RM2,600 in 2023 to RM4,500 in 2030.

Keywords: Industrialization, industrial policy, economic development, Malaysia

Submission: 26th November 2023
Accepted: 9th September 2024
https://doi.org/10.33736/ijbs.8194.2024

1. INTRODUCTION

Following the announcement by Biden-Harris government on the provision of subsidies in support of semiconductor chips assembly, the United States' and the Washington-based Bretton Woods institutions of the International Monetary Fund (IMF) and the World Bank, the leading detractors that for long vulgarized it, are now revisiting industrial policy. Although Mazzucato (2011) advocates for a generic application of industrial policy on a global scale, her emphasis on the focused sector/industry-based specifics have had less traction among policy makers. Mazzucato's (2011, 2018) work on mission-oriented industrial policy can be traced to the works of Johnson (1982), Amsden (1989), Wade (1990), and Kim (1997) who emphasised the role of states in developing strategic industries to catch up with frontier firms. While Mazzucato's (2018) work on the broad-based generic industrial policy goes a long way to justify the recreation of support for industrial policy, this paper uses both the generic aspects, as well as the specific aspects of industrial policy advanced by Rasiah and Nazia (forthcoming) to formulate the pathway for Malaysia to transform the industrial landscape of Malaysia and achieve high value-added status.

Although the Razak administration made export-oriented industrialization as its engine of growth under the New Economic Policy that was launched in 1971 (Malaysia, 1971), its focus then was limited to attracting foreign direct investment (FDI) to create jobs. It was the Mahathir administration that took on industrialization with the objective of diversifying into heavy industries and to support national firms since 1981 that became the government's focus until his departure in 2003. Recognizing the necessity of fostering a embedding ecosystem to stimulate technological upgrading, the Mahathir administration launched a series of policy changes and parastatals to upgrade the country's science, technology and innovation (STI) infrastructure since 1991. However, such initiatives fell short to facilitate the country's transition from upper-middle-income status to high-income status, which was the objective earmarked in the Vision 2020 Blueprint (Malaysia, 1996).

♣ Corresponding author: Miao Zhang, Research School for Southeast Asian Studies, Xiamen University, Email: miaozhang@xmu.edu.cn

Meanwhile, Malaysia launched its first industrial policy (IMP) in 1986 with the assistance of UNIDO. The second (Malaysia, 1996) and third industrial policies emphasized clustering in addition to retaining promotion of strategic industries. While neither truly pursued the cluster-based approach, incredibly all three industrial policies were not driven by target-oriented industrial upgrading, and lacked stringent discipline to meet the upgrading targets (Rasiah, 2011). In fact, the incentives and grants allocated to businesses were not systematically reviewed to determine if their objectives were achieved (Rasiah, 2022). Consequently, no Malaysian firm in Malaysia had by 2020 reached the technology frontier in the manufacturing industry. The New Industrial Master Plan 4 (NIMP4) seeks to ameliorate some of these problems through emphasis on complex products and a mission-oriented industrial policy (Malaysia, 2023b).

While industry typically includes manufacturing, mining, and construction, since the core driver of the sector is manufacturing (Kaldor, 1967), the industrial policy focus in this paper is exclusively on manufacturing. Also, as argued by Rowthorn & Wells (1987) and Kaldor (1967), economic structural change is typically driven first by the primary sectors before it is taken over by the secondary sectors with manufacturing as the engine of growth. Subsequently, the services sector takes over to lead economic structural change. However, unsuccessful development efforts often result in premature deindustrialization or a premature entry into service sector specialization (Rasiah, 2011; Rodrik, 2016).[1] Hence, this paper deals with broad-based and industry-specific interventions that spread to all sectors. In addition to spelling out the generic and specific aspects of industrial policy for transforming the Malaysian economy, the paper will elucidate three industrial strategies national firms in the country should consider a transition from low to medium, and to high value-added activities (see also Rasiah, 2022).

After this Introduction, the following section will examine structural change in Malaysia to address various economic deficiency syndromes. Subsequent section shall explain the significance of generic economy-wide industrial policies (see Mazzucatto, 2011, 2018) and sector-specific industrial policies (see Nazia & Rasiah, forthcoming). The paper will then address the critical need to strengthen the embedding ecosystem institutions and organizations to stimulate industrial upgrading. Three critical firm-level strategies associated with industry-specific industrial policies are then discussed as possible drivers for industrial catch up in Malaysia before the paper conclude with key finding and policy recommendations.

2. THEORETICAL CONSIDERATIONS

Industrial policy was originally conceived to include its capacity to not only stimulate increasing returns (differentiation and division of labour) in manufacturing and its appendages, but also to stimulate economic synergies that stretches to the whole economy (Smith, 1776; Young, 1928). The general structural argument on economic change is that as an economy grows, the manufacturing gradually takes over as the engine of growth from the primary sectors of agriculture and mining, which eventually succeeded by the service sector (Kaldor, 1967; Rowthorn & Wells, 1987). However, some economies have faced the transition between the sectors before the earlier ones fully mature to supporting strong productivity growth. This is evident in Indonesia, the Philippines, and Pakistan, experiencing premature deindustrialization while Malaysia has faced both premature contraction in agriculture and manufacturing.

Another key argument often ignored in examining industrial policy is the contribution of evolutionary economics on the role of institutions and institutional change in industrial upgrading (Veblen, 1899; Nelson & Winter, 1982). For long the evolutionary view of institutions was overshadowed by the new institutionalist theory that the market reigns supreme in economic transactions so that other institutions only have a role to fill up those spaces left behind by markets (see Coase, 1937,1992; Williamson, 1981). Unlike the new institutional arguments, the evolutionary economists argue that a blend of institutions, rather than any defining each other role, that are not only behind economic transactions but also profoundly shape policy planning, policy making and policy implementation (Zhang & Rasiah, 2015). Indeed, industrial policy seeks to promote desired future endowments to achieve competitive rather than static comparative advantage. Additionally, institutional coordination is often central to shape the flow between planning and execution. Indeed, while criticizing the simplistic claim by Acemoglu and Robinson (2012) that China is a monolithic extractive state that is dominated by central planning, Zhang and Rasiah (2015) show how the two-way flow of information and interaction between the initiation of

[1] The premature entry into services often happens when the manufacturing and agricultural sectors starts declining before reaching maturing with services expanding to absorb workers released these sectors to participate in low- and medium value activities that do not show the proliferation of innovation-driven knowledge-based activities (Rasiah, 2011).

policy by the central government, which is than intermediated by the provincial government between the central government and the municipal governments that implement policies that has helped achieve desired outcomes to explain China dramatic transformation of affordable urban housing scheme. While the focus of their argument is on urban housing, a similar coordination approach can be envisaged and pursued in regional industrial development.

Three recent developments have lent newfound support for industrial policy. Firstly, the heightened focus on climate resilience has emerged as a critical imperative, fuelled by escalating global apprehensions about climate change. This trend gained momentum in the 1990s but became particularly pronounced following the landmark Paris Accord of 2015. Governments worldwide are recognizing the urgency to address the environmental challenges posed by global warming. The impetus for climate resilience necessitates a strategic and coordinated approach, aligning economic activities with sustainable practices. This shift goes beyond mere environmental responsibility; it encompasses a holistic restructuring of industries to mitigate and adapt to the impacts of climate change. Recognizing the intricate interplay between industrial practices and ecological stability, governments are turning to industrial policy as a linchpin in their broader climate action plans. Industrial policy, traditionally associated with economic development, is now undergoing a renaissance as a powerful tool to foster green and sustainable practices, by driving innovation in eco-friendly technologies, and propelling industries towards carbon neutrality. In essence, the increasing emphasis on climate resilience underscores the imperative for governments to integrate environmental considerations into their industrial policy frameworks.

Secondly, the advent and proliferation of industrial revolution 4.0 technologies since the turn of the millennium, which offers the opportunity to establish autonomous monitoring for the smartification spaces in which intelligent city planning and monitoring for the lifting of living standards across different classes and cultures is increasingly becoming a reality. Governments have been central to the policy formulation and implementation of smart city policies. Smart cities use information and communication technology to improve operational efficiency, while sharing information with the public to improve the quality of government services and welfare. The intensified smartification of intelligent operating centres offer has helped countries strengthen climate resilience. The primary objective of smart cities is to optimise the functions of cities while promoting economic development. In doing so, it is to assist populations in those cities to raise the quality of life by using smart technologies and increasing access to data. Given that capabilities and competencies evolve with time, smart cities have undergone several phases of development. As it is now, several cities in China have undergone major phases of smartification.

Thirdly, the rise of China as a technological powerhouse through strong government support has attracted several developed countries to follow suit, though industrial policy was always undertaken by these countries either through their national science body or in support of R&D activities. An illustrative instance of this emulation is evident in the proactive stance taken by the Biden-Harris administration in U.S.. In a strategic move to compete with China's semiconductor production, U.S. government dedicated US52 billion through the Chips and Science Act of 2022 with US39 billion to be offered as incentives for companies to establish semiconductor manufacturing plant.. Furthermore, the administration subsequently announced a $15.5 Billion funding to support the transition of industry towards lowing industrial emissions (U.S. Department of Energy, 2023). On July 25, 2023 the European Union Council approved the European Chips Act to expand chip production to grow the European market share of microprocessors in global supply chains, which is expected to attract €43 billion to address supply chain shortages to increase Europe's share of the world's semiconductor chips market (European Commission, 2022; The Verge, 2023).

Importantly, China has followed the carrots-and-sticks approach of Sen (1983) to incentive innovation and penalize failure. The dramatic development of smart cities and electric vehicles in China has much to do with attracting foreign technology but with major thrusts into R&D to adapt and evolve from there. Smart cities in China have evolved four phases to keep abreast with time. Starting later that Malaysia in the late 1990s when Malaysia began in 1991 through the Way Forward policy, but the latter has not evolved beyond its initial phase. Hence, for example, in the Longgang District in Shenzhen, Huawei has installed over 200,000 CCTVs to monitor the coordination of economic and climate change activities. Among the services citizens get include displays of falling emission, traffic, and accident levels.[2] Meanwhile, starting from 1995, China produced 60 percent of the world's electric vehicles (EV) in 2022 and its national firm BYD had overtaken Tesla as the chief manufacturer of EVs. Tesla is completely American owned in China, but its operations played an important role to stimulate technology transfer to the national firms.

[2] Interview by Rajah Rasiah at Huawei's control operations in Shenzhen on 18 May, 2023.

While some economists attempted to derive quantitative metrics for transition periods when different sectors undergo shifts in employment generation and productivity expansion (Rowthorn & Wells, 1987; Rodrik, 2016), a more tangible observation lies in the changing value-added shares in GDP, and the changing value-added contribution of each sectors' gross output. This approach proves helpful in capturing upgrading dynamics, particularly when the value-added shares (profits, salaries and wages in gross output) coincide with stagnating or falling value-added shares in GDP. Given the tendency for employment intensity to fall as capital intensities and technological intensities rise, sectors' contribution to employment should be excluded unless it is measured over the whole economy. This is especially the case when automation and industry 4.0 technologies proliferate in an economy. Typically, sectors face premature contraction when slow technical change does not support productivity increments in the face of competition.

In the context of this paper's manufacturing focus, a dedicated examination unfolds, probing into the trajectory of premature deindustrialization and the NIMP4 endeavor to reindustrialize Malaysia. While several papers exist on premature deindustrialization in Malaysia (e.g., Rasiah, 2011, 2020), this paper not only extends the analysis till 2023 but also offers a critical assessment of the latest government initiative to instigate a positive reinvigoration of industrialization agenda.

3. STRUCTURAL CHANGE TOWARDS MANUFACTURING IN MALAYSIA

Manufacturing promotion started in Malaysia through the Pioneer Industry Ordinance in 1958, which promoted import substitution of final consumption goods and intermediary goods, such as iron and steel. These industries started to enjoy incentives for assembly and processing manufactured goods that was imported prior to that. The came to be known as "screwdriver industries" as the manufacturing relying minimally on domestic suppliers. The early focus on attracting FDI to support export-oriented industrialization in Malaysia was to raise the gross fixed capital formation, create jobs, and spur exports. This initiative began in 1968 gaining momentum especially after the enactment of the Free Trade Zone Act of 1978. There was no emphasis on technological upgrading until the first industrial master plan was launched in 1986 (Malaysia, 1986; Rasiah, 1995). However, apart from identifying strategic industries for promotion, IMP1 did not establish upgrading targets and reviews to ensure achievement. Consequently, the steep expansion of manufacturing slowed down substantially following the 1997-98 Asian financial crisis. A combination of an over-valued real exchange rate in 1990-97 and sluggish industrial upgrading reduced the competitiveness of manufactured exports.

The Second Industrial Master Plan (IMP2) in 1996 accentuated cluster development but inadvertently promoted industries without a discerning focus, as all industry sectors were deemed strategic, whether in iron and steel or electronics and avionics (Malaysia, 1996). Besides, the blueprint did not provide a profound action plan and no technology-based targets to upgrade to. The Third Industrial Master Plan of 2006 continued with the cluster approach but in essence extended the IMP2 with its shortcomings (Rasiah, 2011).

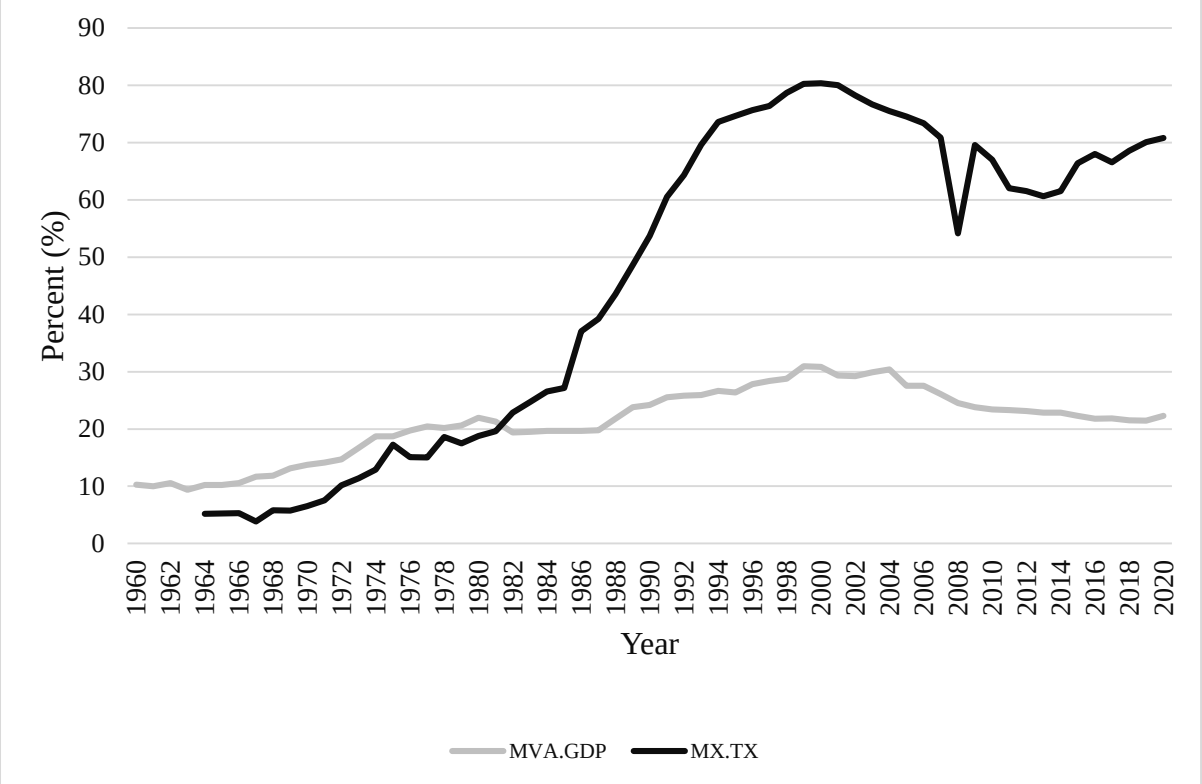
More importantly, both the IMP2 and IMP3 discouraged upgrading, as the embedding ecosystem failed to appropriate the synergies that was expected from the launching of the Action Plan for Industrial Technology Development (APITD) in 1991. Despite the introduction of science and technology parks, targeted R&D support for specific industries, such as the corporatization of the Malaysian Institute of Microelectronic Systems (MIMOS), the Multimedia Super Corridor (MSC), the Malaysian Technology Development Corporation, the Human Resource Development Council, and the Malaysia Digital Economy Corporation (MDEC).

Meanwhile, the regional corridors launched in 2008 offered considerable promise as it enabled the room for regional, provincial, and local authorities to participate in shaping balanced industrialization. Among the useful things, this approach offered infrastructure development tailored to local conditions, and to impose progressive conditions, such as hiring of local personnel, utilizing local inputs, and focus on high-tech activities (Zhang and Rasiah, 2015). While successful to a large extent, the lack of coordination with central authorities, such as the Malaysian Industrial Development Authority (MIDA), and the taxation bodies diminished its impact on spurring industrial upgrading.

Despite the potential offered by the regional corridors, the period from 1995 to 2023, during which the second Industrial Master Plan (Malaysia, 1996), the third Industrial Master Plan (2006), and the Regional Corridor development programs were implemented, witnessed a lack of substantive transformation. As a result, manufacturing specialization gradually gravitated towards low and medium value-added goods with strong use of foreign low-skilled labour (Rasiah, 2011). Such a gradual downgrading largely explains the trend fall in

manufacturing value-added in GDP and manufactured exports in total exports over the period 2000-2022 (Figure 1). Among the major catastrophic downfalls include the failure of nationally led Proton in car manufacturing and Silterra in semiconductor fabrication to break even, which led to the sale of a significant share of company equity to Chinese firms in exchange for cutting-edge technology.

Figure 1: Manufacturing Value-added in GDP and Manufactured Exports in Total Merchandise Trade, 1960-2020



Source: Computed from data gathered from World Bank (2023)

Given the ineffectiveness of the selection, monitoring and appraisal mechanism used to stimulate industrial upgrading following the APITD of 1991, when launching the 4th Industrial Master Plan in 2023, the Malaysian government called for an effective mechanism for it to ensure successful industrial upgrading. The NIMP4 aims to address past shortcomings and has introduced a mechanism for critical review against targets set for achievement. The government emphasized the establishment of a delivery system designed to subject the NIMP 4 to stringent appraisal and rectification, aiming to achieve its goals of increasing mean incomes and skilled jobs while reducing the budget deficit to 3.2 percent of GDP by 2025, ensuring that tax revenue eventually surpasses debt growth in GDP. The latter requires the achievement of tax buoyancy, which can only be achieved if serious value-added upgrading indeed takes place.

The new government chose to inject greater dynamism in the NIMP4 when it launched in 2023. Although the NIMP4 does not provide clarifications that offer us the ammunition to evaluate its potential, it does offer the following promise:

1. Emphasis on shifting towards more complex export products, focus on IC design, and shifting gears towards raising firms and organizations' participation in IR 4.0 systems, and strengthening climate resilience.
2. Creation of 3.3 million skilled manufacturing jobs over the period 2023-2030
3. A dashboard that sets the achievement targets for upgrading, and a review committee to ensure that these upgrading targets are met.

The focus on deepening training with a target of creating 3.3 million skilled jobs and efforts to widen dual training by exposing trainees from TVET organizations to firm experience look good, the lack of enforcement and participation by firms leaves much to be desired.[3]
The NIMP4 obviously looks better organized than the IMP1, IMP2 and IMP3 as it offers a clearer action plan, and for the first time, governance towards achieving targets. However, the problems with this plan include the use of complex products over value-added, and the strategies to achieve them. Hausmann et al (2011) built their framework on complexity of export products using trade classifications that place products of various value-added into same groups, e.g., the high value-added microprocessors is in the same SITC 5-digit classification as the low value-added capacitors and resistors. However impressive it looks on paper, the lack of actual measures focused on value-added upgrading has made it vague and detached from the processes of industrial upgrading. In addition, both the United States and European Union have moved on to introduce explicit industry-specific industrial policy approach by introducing massive subsidies and grants to stimulate strategic specific industries, eg., semiconductor assembly (European Commission, 2022; U.S. Department of Energy, 2023). Besides, such complexity gives little direction for the diversification of economies.

In addition, while it is fine for Singapore to specialize on chip design owing to the lack a critical population size, Malaysia is a much larger country both by land size and population size. Besides, having experienced electronics expansion since 1970, Malaysia should build the human capital endowments to move up the value chain in this industry rather than just focusing on chip design. In that sense the government set aside MYR90 Billion to spur the transformation of manufacturing from low-value-added and medium-value-added industries to high value-added industries. While the government attempts to take advantage of the geo-political friction between the United States and China to expand quickly into semiconductor fabrication and assembly with significant participation in both fab and fabless manufacturing, the massive subsidies announced by the European Union and the United States to substitute their imports suggests that this approach should be considered carefully.

Besides, given the future of automobiles heading into Electric Vehicles (EV), it is pertinent for the government to emphasize the development of national supplier firms to increase spillover from the foreign imports of such vehicles. For example, allowing companies like Tesla to enjoy complete foreign ownership should be accompanied by a concerted effort by the government to promote domestic spillovers. A key strategy should involve a heightened focus on raising taxes from sales to offset potential losses from resource outflows. Robust foundation of Malaysian Electronics and Electrical (E&E) manufacturing could be leveraged to establish a national EV supplier network, and the two dynamic sectors could generate immense potential for synergies and growth. Also, the NIMP emphasizes the proliferation of IR4.0 and climate resilience technologies to transform all sectors (which has been the case since turn of the millennium), but the dashboard governance established with the plan should also be translated into a target-based achievement of milestones.

Table 1: Industrial Indicators, Malaysia, 1968-2030

Period	Policies	GDP annual growth (%)	Manufactured Export in Exports*	Unemployment (%)#	Poverty incidence (%)#
1970-80	EO, IIA 1968; FTZ 1971	8.1	13.5	5.6	37.4
1980-1990	IS, EO, IMP 1, PIA 1986	5.9	36.2	4.5	16.5
1990-2003	IMP 2; APITD	6.1	80.0	3.6	5.7
2003-2023	IMP 3; Regional Corridors; IR4	4.5	70.8	4.5	8.4
2023-2030	NIMP4, Promotion of complex products targeted at progressive wages	6.5*	80.0*	3.3 million skilled jobs	0 hardcore poverty

Note: * - mean % figures over the periods; # Period end % figures; poverty incidence for the year 2005 is for 2004, which is the nearest figure available.
Source: Compiled from Malaysia (various years); World Bank (2022); Malaysia (2023a,2023b).

[3] A Malaysian variant of the dual training system was introduced through the 11th Malaysia Plan in 2016, and was reinforced with further expansion of it through the 12th Malaysian Plan (Cheong & Li, 2022; Malaysia, 2021, 2023).

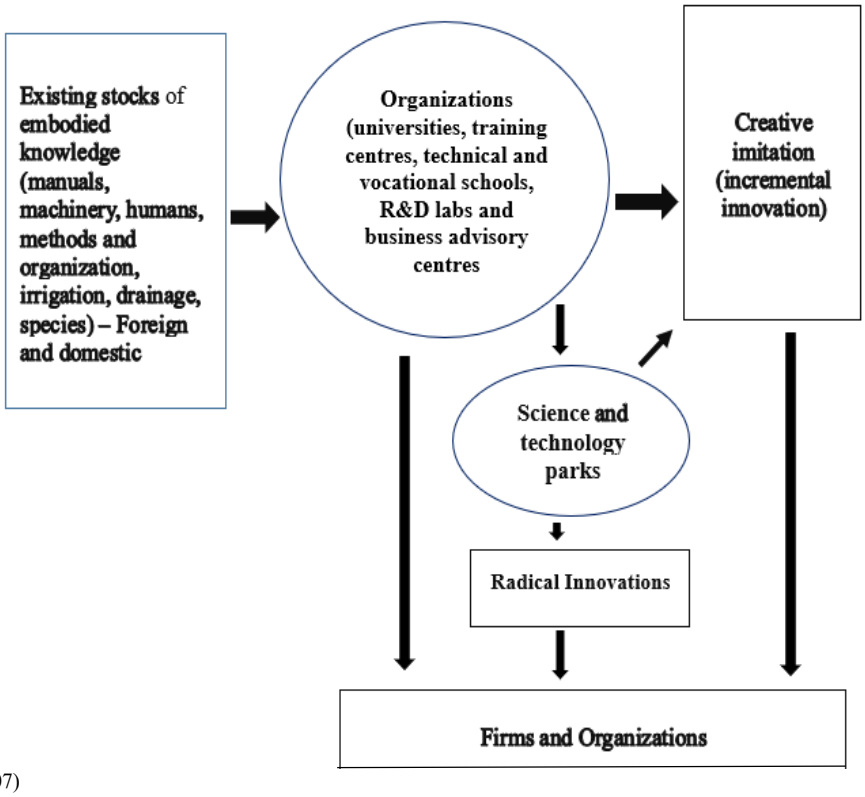
3.1 The Embedding Ecosystem

While policies to strengthen the embedding ecosystem to create the intermediary organizations were largely launched in the 1990s, the policies to stimulate digitalization and digitization, and climate reliance were introduced since the turn of the millennium, especially since 2018. Among the four pillars of the Systemic Quad that Rasiah (2007) identified as important foundations of effective clustering, as well as pillars of the ecosystem embedding firms, Rasiah showed that Malaysia is endowed well with basic infrastructure and enjoys strong trade and investment linkages. The barriers to industrial upgrading in the country are a weak STI infrastructure and effective network cohesion between firms and critical intermediary organizations (Rasiah, 2010; Yeap & Rasiah, 2023; Kiranjeet, Hemant & Rasiah, 2023).

The government's efforts to transform the STI infrastructure following the launching of the APITD resulted in the proliferation of incentives and grants to support innovation, especially in the strategic sectors, the science and technology parks that were developed along with the human resource development council, the corporatization of MIMOS, the Malaysian Technology Development Corporation (MTDC), Malaysia, Industry, Government, High Technology (MIGHT) body, the Multimedia Super Corridor (MSC), and R&D funding through Intensification of Research in Priority Areas (IRPA) offered Malaysia a solid foundation for strengthening the embedding ecosystem to support industrial upgrading in firms. However, poor coordination between these bodies and firms, selection weaknesses, and a lack of a profound review on commercialization results rendered poor outcomes (Rasiah, 1995, 2010). Consequently, the incubation centres established at the science and technology parks enjoyed little prototyping and scaling up opportunities.

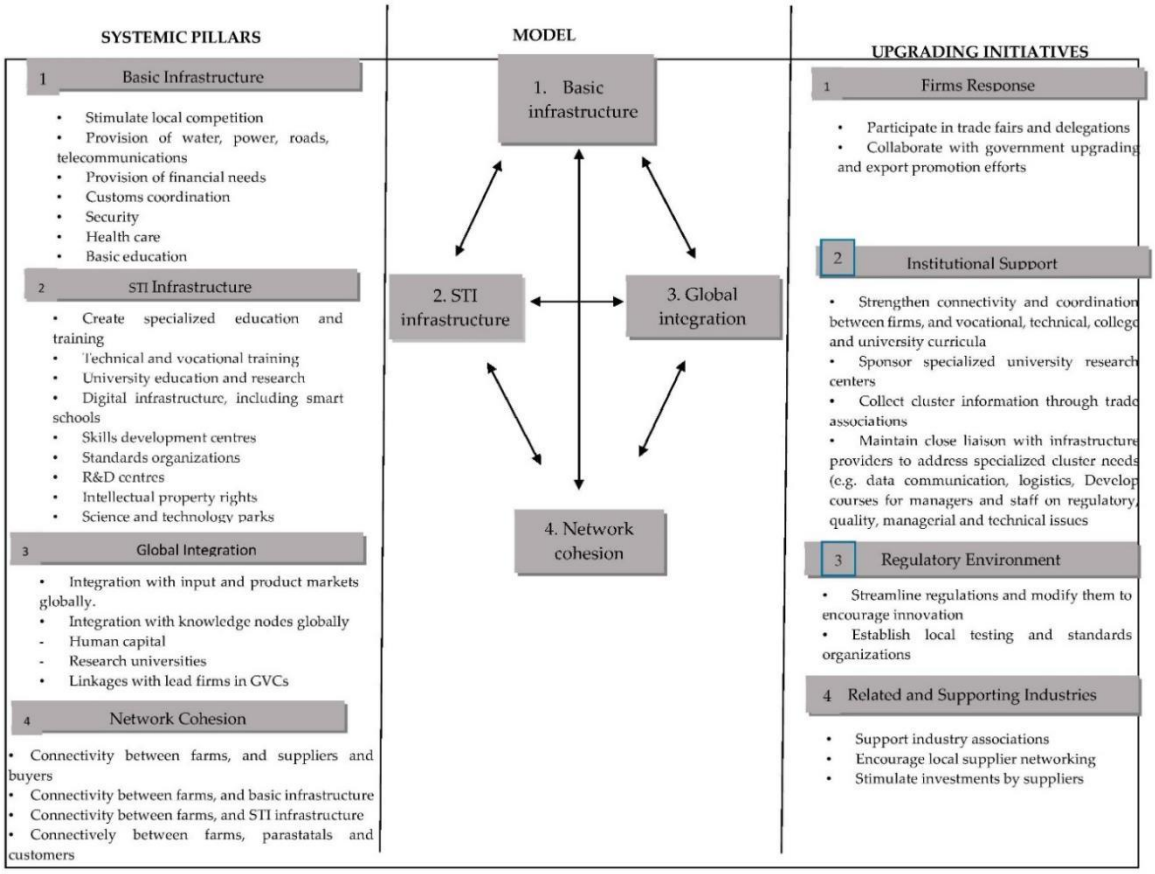
Initiatives must be taken to reinvigorate the S&T parks. The stylized framework shown earlier (Figure 2) and the systemic quad (Figure 3) should be the basis for the revision of the ecosystem system framework to focus on STI as a major critical component of this framework. In addition to imposing stringent performance targets for the intermediary organizations that constitute STI infrastructure and penalties for non-performance, the government must upgrade the human capital in the country with a focus on stimulating industrial upgrading to high value-added activities. The prime focus must be in raising the quality of technicians and engineers.

Figure 2: Institutional Framework for Promoting Industrial Upgrading



Source: Rasiah (2007)

Figure 3: Systemic Quad for Industrial Upgrading



Source: Rasiah (2019)

Value-added shares in gross output of industries in the Malaysian manufacturing sector has largely either stagnated or declined since the turn of the millennium (Rasiah, 2020). The value-added share of manufacturing output in the sector has faced a trend fall since 2000. While the first three industrial policies stimulated the growth of manufacturing with the second and the third promoting technological upgrading and clustering approaches, industrial firms in the country have largely remained in low and medium value-added activities. The third industrial policy led to development of regional corridors since 2008.

Despite massive outlays made to promote R&D, which as a share of gross national income, rose from 0.85 percent in 2008 to 1.4% in 2016, the patents granted and commercialization from the sector have remained significantly lower than that of South Korea (Rasiah, 2020). Also, following a lack of commercialization achieved from the rise in the share of Gross Expenditure in R&D (GERD) in GDP, the lack of an equivalent increase in patenting and commercialization drove the government to reduce the expenditure on R&D, which culminated in the GERD to GDP ratio falling in trend terms to 1.05 percent in 2018 and to 0.95% in 2020. The 2020 figure fell significantly short of Israel (5.4%), South Korea (4.8%), China (2.4%), and Thailand (1.3%) (UNESCO, 2021). Also, unlike that tied grants approval to commercialization by requiring applicants to show a minimum 50 percent participation by firms, much of the grants provided by the Malaysian ministries focused on scientific publications (Rasiah & Lin, 2005; Rasiah, 2020).

The NIMP4 seeks to free Malaysia from the middle-income trap, especially on growing GDP per capita over the 2023-30 period by 6.5 percent annually on average through stepping up value-added among the targeted strategic industries. Also, while Malaysia has undergone premature deindustrialization since the late 1990s, strategies to reinvigorate the sector must catch the two major waves emerging since the 1990s and 2000, which are climate resilience and smartification initiatives. The NIMP4 provides significant attention to these broad-based policies. However, unless the export-oriented engines are not negatively affected by the push to upgrade, expecting such a massive jump in value-added growth in such a short time in the face of serious food shortages and infrastructure bottlenecks may actually cause overheating.

3.2 Generic and Specific Industrial Policies

Since climate resilience, and digitalization and digitization are diffusing throughout individual economies, there is increasing emphasis on broad-based industrial policy and specific industrial policies (Mazzucato, 2011, 2018). The emphasis on the latter has taken on prominence following supply chain disruptions caused by the US adopting a China-containment policy that has starved the West of critical semiconductor supplies. Consequently, both the United States and the European Union has approved massive subsidies running into billions of Euros to support chip assembly (European Commission, 2022; U.S. Department of Energy, 2023).

While generic economy-wide industrial policies are important, such as interventions essential to stimulate the diffusion of greening technologies and fuels and digitalization and digitization, the essence of industrial policy targeting sectors likely to evolve the strongest economic synergies requires emphasis on specific sectors – some being critical to stimulate strong structural economic complementarities (such as semiconductors and machinery and equipment) while others driven by current and potential relative future endowments, (such as palm oil and oleo chemicals).

While Malaysia's carbon net zero target of 2050 is the focus to pursue, broader emphasis on climate resilience should take on as the policy focus for industrial policy. Since the achievement of these targets has very much been strategized through the development and deployment of digitalization and digitization technologies, they can be conceived collectively rather than independent of each other. In other words, the advent of increased smartification following the diffusion of AI technologies has resulted in these technologies supporting efforts to strengthen climate resilience.

Consequently, while efforts to promote climate resilience, and digitalization and digitization should be undertaken jointly, these technologies should be promoted aggressively in industry-specific policies that earmark countries' strategic industries, such as aerospace that received RM1 billion allocation under the 12th Malaysia plan. In making this point it is pertinent to examine strategic approached firms take to operate at the technology frontier. Rasiah (2022) offered three broad strategies firm use that are both defined by approach and the nature of the industry involved. In the first, as pursued by the United Microelectronics Company of (UMC) Taiwan the firm focuses on catching up to proliferate new technologies horizontally without leapfrogging the lead firms. In the second approach, the Taiwan Semiconductor Manufacturing Corporation (TSMC) caught and leapfrogged Texas Instruments to shape the globe's logic chips technology frontier. In the third, Samsung through the blending of android phones integrated several uses, including functional through the blue ocean strategy. The NIMP4 appears silent on these issues.

4. IMPLICATION FOR MALAYSIA'S INDUSTRIAL UPGRADING

The NIMP4, launched on September 1, 2023 offers some critical strategies to stimulate industrial upgrading. In addition to a more robust action plan, the NIMP 4 promises to stimulate industrial upgrading to facilitate the realisation of progressive wages so that the median wage shall rise from RM2,600 in 2023 to RM4,500 in 2030 with the creation of 3.3 million skilled workers (Malaysia, 2023b). Climate resilience and digitalization were the two generic policies extensively addressed in the NIMP4 (Malaysia, 2023b). These are broad-based policies targeted at the entire economy. A range of policies already existed to promote climate resilience and industry 4.0 technologies, particularly since the sustainable development goals (SDGs) were launched by the United Nations.

4.1 Greening Policies

The government of Malaysia, particularly since the launching of the NIMP4 has embarked on strengthening climate resilience and stimulating digitalization as broad-based strategies to reach the entire national economy. Given the Intended Nationally Determined Contribution (INDC) the Malaysian government submitted to the United Nations Framework Convention for Climate Change (UNFCCC), the NIMP4 reinforces the government's resolve to meet the reduction of carbon emissions targets, which would mean the lowering Green House Gas (GHG) emissions to 20 percent by 2025, 45 percent by 2030, and 100 percent by 2050. The present arrangement focuses on the BURSA handling carbon capture, its trading, and carbon taxes to disincentivise the use of carbon production. Such an initiative is carried economy-wide to stretch into all sectors.

Apart from the Net Energy Metering (NEM) scheme, Malaysia has also introduced the Large-Scale Solar (LSS) competitive bidding programme to drive down the cost of energy for the development of large scale solar photovoltaic plants. The NEM complemented the FiTs and LSS programs. The first tender of LSS was released in 2016 with a total aggregate capacity of 200 MW in Peninsular Malaysia and 50 MW in Sabah, followed by the second round in 2017 with an increased total aggregate capacity of 360 MW in Peninsular Malaysia and 100 MW

in Sabah/Labuan. The third round of LSS bidding opened in February 2019 for an estimated RM2 billion ($490 million) worth of projects with a target aggregate capacity of 500 MW and with expected commissioning in 2021. At the time when the second LSS was conducted the reference price stood at 32 cent per kWh ($0.078 per kWh). The lower prices can be attributed to the technological advancements as well as the open bidding for tenders so that the prices are competitive (Rasiah, Siti Indati & Amar, 2022).

In addition to solar PV, the government is also focusing on pricing related but other renewable energy technologies so that they become competitive with gas-based projects in Malaysia. The Sustainable Energy Development Authority (SEDA) has introduced competitive bidding for small hydropower and biopower technologies. The inaugural e-bidding for small hydropower systems has been introduced in 2019. The implementation of the Malaysia Energy Supply Industry 2.0 (MESI 2.0) plan could drive the country to achieve the target. According to the plan, renewable energy generators do not need to sell electricity to the national utility company TNB. The green energy trading could be done through the grid which would create higher competition (Gopi Krishnan, Azleen, & Zulfadhlee, 2022; Malaysia, 2023).

With a series of measures taken by the government to increase public-private partnership and private financing, the country should witness more investments coming from private players in the renewable energy sector which could ultimately propel the growth of the sector and the country might achieve its 2025 target. Although it is unclear if there is already evidence of GDP growth being decoupled from fossil fuel consumption, the targeted approach by the government to lower GHG emissions by 45 percent by 2030 and achieving carbon net zero by 2050 appears to be on schedule.

Predictions on further expansion of RE have been constrained by a lack of a clear view of production trends, which has been demonstrated by a record fall in renewable energy technology costs in 2018. The global weighted-average cost of electricity from concentrated solar power (CSP) declined by 26 percent, bioenergy by 14 percent, solar photovoltaics (PV) and onshore wind by 13 percent, hydropower by 12 percent, and geothermal and offshore wind by 1 percent between 2017 and 2018 (IRENA, 2023). Falling RE costs will indeed lower the earlier estimations for substituting fossil fuels with RE in Malaysia.

To encourage more people to use renewable energy, such as solar power, SEDA has introduced a peer-to-peer (P2P) energy trading programme. The programme supports those who generate excess energy through their solar photovoltaic (PV) panels to sell the additional power to other consumers. Malaysia is the second Asian country, after Thailand, to launch a peer-to-peer energy trading project aimed at competitive trading of electricity prices (Gopi Krishnan, Azleen, & Zulfadhlee, 2022; see also Rasiah & Gopi Krishnan, 2024).

While the target the UNFCCC (United Nations Convention for Climate Change, 2023) has underlined for countries to strengthen climate resilience is lowering gradually carbon emissions, and in the case of Malaysia achieving carbon net zero by 2050, the NIMP is among the policies that is attempting to strengthen climate resilience by extending that focus to include reforesting, raising conservation efforts, ending land reclamation and damming, introducing, and enforcing institutions to lower solid and fluid waste disposal from the manufacturing sector (Malaysia, 2023b).

4.2 Digitalization and Digitization

Apart from fostering an environmental responsive policy for economic growth, the surge in artificial intelligence has spurred governments worldwide to craft industrial policies geared towards not just embracing but actively promoting digitalization and digitization. To realize the national aspiration, The Malaysian Digital Economy Blueprint stands as a testament to the nation's unwavering commitment to harnessing the power of digitalization for the benefit of all. The Blueprint was introduced in 2021. At its core, it delineates ambitious targets for the digital economy's contribution to Malaysia's economic landscape and industrial competitiveness. The Blueprint championing a collaborative approach between businesses, communities, and government entities through the Six Strategic Thrusts, meticulously crafted to drive digital transformation across various facets of society. From revolutionizing the public sector to fostering an inclusive digital society, each thrust is underpinned by a comprehensive strategy aimed at propelling Malaysia to the forefront of the digital frontier.

In tandem with the rise of the digital economy is the advent of the Fourth Industrial Revolution (4IR). As industries worldwide grapple with unprecedented change, Malaysia stands poised to capitalize on this transformative wave, leveraging the integration of data and digital technologies to fuel industrial upgrading and economic growth. Before 4IR, the Industry4WRD: National Policy on Industry 4.0 was launched in 2018 to drive digital transformation of the manufacturing and related services sectors in Malaysia. In order to create the right ecosystem to support manufacturing to move global value chain and elevate the contribution to national GDP and FDI inflow,

the policy framework entitled F.I.R.S.T, short for Funding, Infrastructure, Regulations, Skills & talents and Technology, was introduced as strategic enablers to drive future industry and digital economy, leveraging on technology and innovation-led economy in line with government's endeavour to achieve shared prosperity vision and high-income advanced economy.

Facilitating the execution of the Blueprint is the National Digital Economy and 4IR Council, a visionary administrative structure tasked with steering the nation towards digital excellence. With a clear focus on efficiency and accountability, this council aims to serve as the vanguard of digital governance, driving policies, strategies, and initiatives aimed at realizing the national aspirations to transform Malaysia into a digitally-driven, high income nation and a regional leader in digital economy. Central to the council's governance framework are key features designed to ensure success. From a Strategic Change Management Office dedicated to instilling a digital mindset nationwide to transparent monitoring and evaluation mechanisms, each component is geared towards fostering collaboration, accountability, and success.

From the above-mentioned policy on digitalization and industrial upgrading recently implemented in Malaysia, it is evident that digitalization has emerged as both a means and an end to achieve industrialization. As return, industrialization and upgrading industries will inevitably promote the development of digitization and digitalization by providing more convenient means such as ICT. In recent times, the focus of these government policies has shifted towards creating an ecosystem conducive to achieving policy objectives. This encompasses essential elements of industrial upgrading as outlined in the Systemic Quad (Rasiah, 2007), including technology, infrastructure (both ICT and traditional infrastructure), and social capital (encompassing talent and the flow of tacit knowledge). These are essential policy instruments critical for the effective and orderly development of the embedding organizations, and the regulatory framework needed to quicken the appropriation of socioeconomic synergies from digitalization and Industry 4.0 technologies (Rasiah et al., 2023). Meanwhile, the effectiveness of policy implementation relies on not only the multi-ministerial coordination and cooperation, the role of sub-national government and the state-business nexus shall be also essential prerequisites for the effective implementation of industrial policies (Zhang & Rasiah, 2015). Propelling Malaysia's aspiration of digital transformation and Industry 4.0 transformation will require a concerted effort across many stakeholders, including ministries and agencies, authorities at different levels, industry and business sectors, research facilities and academic institutes (Tham & Atan, 2021).

4.3 Future of Malaysia's Industrial Policy

The discussion based on existing policies naturally reflects the future development path of Malaysia's industrial policies. Firstly, it is imperative to create an ecosystem that fosters an organic and favourable socio-economic environment for industrial upgrading. This should encompass the four key elements outlined in Rasiah's Systemic Quad, as well as other elements such as financial support that may have broader implications (Raisah, 2007). Secondly, industrial policies, subject to political mobilization and manoeuvre, inherently require the participation and collaboration of various stakeholders from all levels. The relationship between federal and state governments, state-business relations, and multi-ministerial coordination are all crucial to the effective implementation of the industrial policies. Future industrial policies should delineate the responsibilities of each stakeholders and establish performance feedback and appraisal mechanisms. The past development experiences of East Asian developmental states like South Korea and Japan demonstrate that effective policy implementation necessitates a "carrot and stick" approach for incentives and penalties. Although Malaysia's current fiscal system is designed around a heavily centralized federal government, policy implementation still requires the cooperation and collaboration of sub-national authorities. State governments and various authorities (including various ad hoc committees as those committees managing the major economic corridors) should be included in the policy and performance evaluation system. Finally, while NIMP4, with its target-oriented, all-nation approach, promised policy implementation, policy formulation and implementation exhibit path-dependent characteristics. The future industrial policies should assess the strengths and weaknesses of previous policies. Targeted remedial measures should be formulated based on identifying the past weaknesses. Such exercise of policy adjustment and planning are more conducive to realizing Malaysia's industrialization aspirations.

5. CONCLUSIONS

After 69 years of independence in 1957 and 68 years of industrial policies since 1958, Malaysia has successfully ascended to an upper middle-income country. However, it finds itself ensnared in the middle-income trap since the 1990s, with a per capita income of USD13,000 in 2022 whereas the per capita income of South Korea and Taiwan have surpassed USD62,000 in the same year. The NIMP4 offers promise with its targeted milestone and

a committee ready to recalibrate the action plan to navigate industrial policy to transform from low- and middle-value-added specialization to high value-added specialization by 2030. A policy design that integrates both generic and sector-specific measures, coupled with effective implementation, calibration, and appraisal, is crucial for establishing an embedding ecosystem that fosters sustainable and resilient development. The three elements serve as the cornerstones for reigniting Malaysia's national aspirations for industrialization.

Given the pivotal role of institutional coordination to evolve cohesive and integrated embedding ecosystem, the government must reinvigorate the STI parastatals that were first launched in the 1990s so that strong horizontal linkages between these parastatals and firms, addressing collective action problems, such as higher education, vocational training, and R&D. The NIMP4 must take this on as a key pillar to revitalization.

While the NIMP4 holds substantial promise, some instruments pursued lack methodological incisiveness, e.g., the pursuit of complex product exports over deepening value-added. Nevertheless, much depends on the steering and appraisal committee to review and enforce its target-based upgrading milestones. Stringent compliance rules must be applied to minimize unproductive rents that will only burden the country's resources. The guiding principle of the dashboard envisaged in the NIMP4 should prioritize industrial upgrading along the technology trajectory and federal-regional coordination to ensure even industrial development. Looking forward, a more location- and time-specified policy recommendations could further enhance the effectiveness of Malaysia's industrialization efforts. Exploring innovative approaches and incorporating global best practices tailored to Malaysia's unique context can elevate the impact of NIMP4, fostering sustainable growth and competitive advantage in the global landscape.

REFERENCES

Acemoglu, D. & Robinson, J. A. (2012). *Why nations fail: The Origins of Power, Prosperity, and Poverty.* USA: Crown Publishing Group.

Amsden, A. H. (1989). *Asia's Next Giant: South Korea and Late Industrialization.* New York: Oxford University Press.

Cheong, K. C. & Li, R. (2022). The Role of Malaysian Higher Education in IR 4.0. *Journal of International and Comparative Education, 11*(2), 107-117.

Coase, R. H. (1937). The Nature of the Firm. *Economica, 4*(16), 386–405.

Coase, R. H. (1992). The Institutional Structure of Production. *The American Economic Review, 82*(4), 713–719.

European Commission. (2022). *The European Chips Act.* Retrieved September 4, 2023, from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/european-chips-act_en

Gopi Krishnan, V., Azleen, O.R. & Zulfadhlee, I. (2022) Financing Sustainable Development Goals: Trends and Challenges, in Rasiah, R, Gopi Krishnan, V. & Azleen, O.R (eds), *Financing Sustainability with East Asian Experiences.* Kuala Lumpur: Universiti Malaya Press.

Johnson, C. (1982). *MITI and the Japanese Miracle.* Stanford: Stanford University Press.

Kiranjeet K., Hemant K. & Rasiah, R. (2023). Ecosystem Supporting Industry 4.0 Technologies in Textile and Clothing Manufacturing. In R. Rasiah, W. Y. Low & N. Kamaruddin (Eds.), *Digitalization and Development: Ecosystem for Promoting Industrial Revolution 4.0 Technologies in Malaysia.* Abingdon: Routledge.

Kaldor, N. (1967). *Strategic Factors in Economic Development.* New York: Ithaca.

Kim, L. S. (1997). *Imitation to Innovation: The Dynamics of Korea's Technological Learning.* Cambridge: Harvard Business Review Press.

Mazzucato, M. (2011). *The Entrepreneurial State.* London: Demos.

Mazzucato, M. (2018). Mission-oriented Innovation Policies: Challenges and Opportunities. *Industrial and Corporate Change, 27*(5), 803-815.

Malaysia (2023a). *Mid-term Review of Twelfth Malaysian Plan.* Putrajaya: Economic Planning Unit.

Nelson, R. R. & Winter, S. (1982). *An Evolutionary Theory of Economic Change.* Cambridge: Belknap Press of Harvard University Press.

Rasiah, R. (1995). *Foreign Capital and Industrialization in Malaysia.* Basingstoke: Macmillan.

Rasiah, R. (2007). The Systemic Quad: Technological Capabilities and Economic Performance of Computer and Component Firms in Penang and Johor, Malaysia. *International Journal of Technological Learning and Development, 1*(2), 179–203.

Rasiah, R. (2010). Are Electronics Firms in Malaysia Catching Up in the Technology Ladder? *Journal of the Asia Pacific Economy, 15*(3), 301-319.

Rasiah, R. (2011). *Malaysian Economy: Unfolding Growth and Social Change.* Shah Alam: Oxford University Press.

Rasiah, R. (2019). Building Networks to Harness Innovation Synergies: Towards an Open Systems Approach to Sustainable Development. *Journal of Open Innovation: Technology, Markets and Complexity, 5*(3), 70.

Rasiah, R. (2020). Industrial Policy and Industrialization in Southeast Asia. In A. Oqubay, C. Cramer, H. J. Chang & R. Kozul-Wright (Eds.), *Oxford Handbook of Industrial Policy.* Oxford: Oxford University Press.

Rasiah, R. (2022). Manufacturing Transformation. In R. Rasiah, K. Salih & K. C. Cheong (Eds.), *Malaysia's Leap into the Future: The Building Blocks for Balanced Development.* New York: Springer Nature.

Rasiah, R. & Lin, Y. (2005). Learning and Innovation in the Information Hardware Industry in Taiwan: the Role of Markets, Government and Trust. *International Journal of Technology and Globalization, 1*(3/4), 400–432.

Rasiah, R., Siti Indati, M. and Amar Hisham, J. (2022). Energy Consumption and Greening: Strategic Direction for Malaysia, in Rasiah, R., Gopi Krishnan, V. and Azleen, O.R. (eds) *Financing Sustainability: Critical Issues with East Asian Experiences.* Kuala Lumpur: Universiti Malaya Press.

Rasiah, R., Low, W.Y. & Kamarudin, N. (2023). *Digitalization and Development: Ecosystem to Promote IR 4.0 Technologies.* London: Routledge.

Rasiah, R. & Gopi Krishnan, V. (2024). Climate Change and Global Warming Mitigation Policies: Towards Strengthening Climate Resilience in Southeast Asia, in Mathews, J. & Arkebe, O. (eds), *Oxford Handbook of Green Industrial Policy.* Oxford: Oxforc University Press.

Rodrik, D. (2016). Premature Deindustrialization. *Journal of Economic Growth, 21*(1), 1-33.

Rowthorn, R.E. & Wells, J.R. (1987). *Deindustrialization and Foreign Trade.* Cambridge: Cambridge University Press.

Sen, A. (1983). Carrots, Sticks and Economics: Perception Problems in Incentives. *Indian Economic Review, 18*(1), 1-16.

Smith, A. (1776). *An Inquiry into the Nature and Causes of the Wealth of Nations.* London: Methuen.

Tham, K.W., & Atan, S.A. (2021). SME readiness towards digitalization in Malaysia. *Research in Management of Technology and Business, 2*(1), 361-375.

The Verge. (2023). *EU will Spend €43 Billion to Stay Competitive on Chip Production*. Retrieved September 4, 2023.

UNESCO. (2021). *UNESCO Science Report: The race against Time for smarter development.* Paris: United Nations Educational, Scientific and Cultural Organization (UNESCO).

United Nations Convention for Climate Change. (2023). *Climate Action Pathway: Climate Resilience*. Retrieved November 10, 2023.

Veblen, T. (1899). *The Theory of the Leisure Class: An Economic Study of Institutions*. New York: Macmillan.

Wade, R. (1990). *Governing the Market: Economic Theory and the Role of Government in East Asian Industrialization.* Princeton: Princeton University Press.

Williamson, O. E. (1981). The Economics of Organization: the Transaction Cost Approach. *The American Journal of Sociology, 87*(3), 548–577.

Yeap, K. L. & Rasiah, R. (2023). Diffusion of IR 4.0 Technologies in Electronics Manufacturing: The Role of the Embedding Ecosystem. In R. Rasiah, W. Y. Low & N. Kamaruddin (Eds.), *Digitalization and Development: Ecosystem for Promoting Industrial Revolution 4.0 Technologies*. Abingdon: Routledge.

Young, A. A. (1928). Increasing Returns and Economic Progress. *The Economic Journal, 38*(152), 527-542.

Zhang, M. & Rasiah, R. (2015). *Institutionalization of State Policy: Evolving Urban Housing Policies in China*. Singapore: Springer.