Malaysia Meets (and Remains in) the Middle-Income Trap: Lost Coalition amidst Industrial Value Migration

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Abstract: Once an aspiring nation on the path towards achieving high-income status, Malaysia's efforts to break its vicious cycle of low productivity-cum-low wage were hindered by ineffective attempts to form an upgrading coalition. The coalition not only failed to make material progress in addressing industrial needs, but also faced an increasingly isolationist international trade and investment climate where transnational corporations were encouraged to reshore/friendshore productive activities back to their home/like-minded economies. This paper analysed three structural reasons miring the nation in the middle-income trap. Firstly, the Malaysian economy was struggling to establish its competitive niche. This occurred as Malaysia grew increasingly reliant on extractive and service-based industries, while its labour-intensive activities struggled in adapting to the demands of Industry 4.0. Secondly, there was insufficient interest in promoting indigenous technologies and championing industrial upgrading. The state-business coalition primarily focused on highly regulated, non-tradable industries such as utility provision, banking and real estate. Finally, we observed a skills mismatch between the push for science and technology education and the labour market's demand for general, undifferentiated skills to support low value-added operations. Unless these interrelated challenges are effectively addressed, the nation will likely experience frustration in breaking through the impasse.

Keywords: Middle-income trap, declining industrial competitiveness, state-business coalition, skills mismatch, Malaysia
JEL classification: O11, O14, O25

1. Introduction

Middle-income trap (MIT) nations and their economies have been subjects of great interest in socio-economic development studies. These nations rose from low-income status by championing their trading and exporting activities. However, they subsequently got stuck at a non-high income level for a prolonged period. Malaysia,

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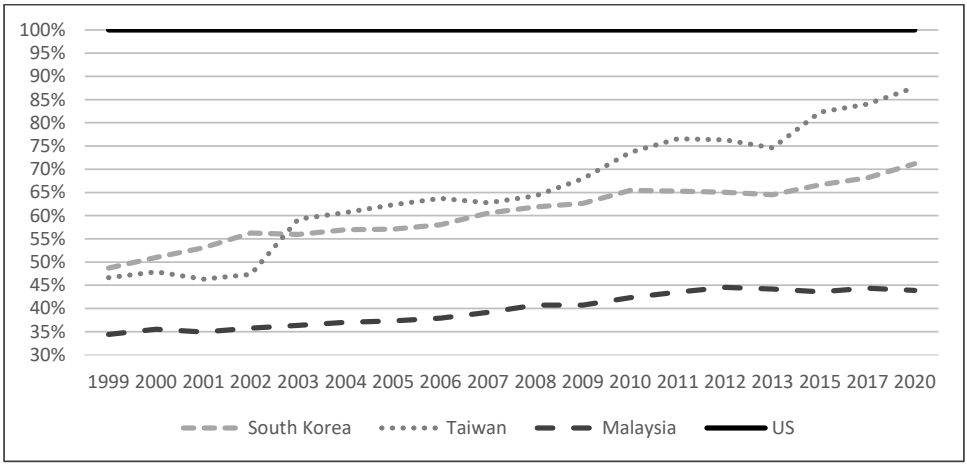

Figure 1. GDP per capita (PPP) for South Korea, Taiwan and Malaysia relative to the performance of the United States (US), 1999–2020
Source: Various sources.

at least in recent years, is one such case. Indeed, Malaysia's GDP per capita at nominal value was lingering around USD10k since 2011.[1] Its GDP per capita relative to the performance of the United States (US) was consistently caught at slightly below 45% since 2012 (Figure 1). The locally owned big businesses were not competitive in exporting and have yet to find their niches in the global value chain even after many years of lucrative financial funding and market protection in Malaysia. Malaysia's open economy was also losing its attractiveness for multinational corporations (MNCs) as its low-cost labour workforce was depleting.

What accounted for this malaise? From the development economics point of view, the trap could be attributed to both market and systemic failures. Several studies highlighted the relationship between the issues of obtaining "productive" capabilities (see Cimoli et al., 2009; Lall, 1996; Paus, 2012) of an economy and its underwhelmingly slow development towards an industrialised nation. On the market side, there are studies (e.g. Lall, 1996, pp. 50–51; Reinert, 2009, p. 86) maintaining that the failure was due to unelaborate state intervention to develop indigenous productive capability and thus curtailing local firms to develop and commercialise locally produced industrial technologies. On the systemic side, there are studies that demonstrated failures of some developing nations in policy learning and thus failed to govern the transition of industrial development (Gustafsson & Autio, 2011; Kang & Paus, 2020; Weber & Rohracher, 2012) from one dependent on long cycle (mature) technologies to one commanding short cycle technologies. Reinert (2009) asserted the importance of economic diversity and industrialisation. He observed economic hierarchy in the

[1] Data is obtained from the World Bank database. Accessed on April 20, 2022 at https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=MY

globalised world and advocated learning economies to scale up and diversify their productive activities to foster new industries. Such drive will give rise to new circulation of industrialists (business elites) and witness a new set of people configuring and commanding new industrial structure at the upper strata (p. 90). Parallel to these studies is Doner and Schneider (2016), who argued that while the middle-income trap was typically explained by economic factors, the root causes were 'more politics than economics'. They further explained that the trap was attributable to a series of inter-twining issues, especially weak state–business ties in pursuing industrial upgrading, government failure in managing economic rent for economic transformation/reform, poor education provision, etc.

Notwithstanding the above insights, such research is generally elusive in terms of contextual overview on how a socio-economic structure an individual nation inherited is impeding progress and advanced development. In addition, it is of doubt if middle-income economies can search and identify industrial niches in the time when the global value chain is evolving rapidly. The world faces challenges on various fronts – material and food supply disruption due to extreme weather and climate crisis, swift change in supply chain due to trade conflict between powerful economies (especially the US versus China), rapid relocation of manufacturing activities due to introduction of technologies under Industry 4.0, and economic shut down and vulnerabilities in the world production system due to the spectre of Covid-19 pandemic crisis. It is alarming if the middle-income trap issues observed in some nations would remain for some time if not escalated.

This inquiry drew us to examine the case of Malaysia, unpacking the industrial governance structure behind its middle-income conundrum. To this end, three interrelated theses are forwarded. Firstly, the Malaysian economy was losing competitiveness as its industries thus far failed to grasp the opportunities stimulated by Industry 4.0. What is more, substituting FDI since the 2010s were generally non-productive, which employed less (and less skilled) personnel to operate their businesses (e.g. finance, logistics, call centre, etc.). Secondly, there was insufficient interest in promoting indigenous technologies and championing industrial upgrading. Instead, the lion's share of attention was channelled towards cossetted, non-tradable industries. Finally, the push for science and technology education coincided only partially with corporate demand for undifferentiated skills to support low value-added operations.

The paper adopted process tracing as its method of analysis. Additionally, it incorporated descriptive statistics derived from secondary sources of data, scholarly research reports, archival and government's open data, and newspaper articles. As we have conducted fieldworks on industrial development and upgrading policy in Malaysia for over a decade (e.g. Gomez et al., 2021; MASTIC, 2016; MOSTI, 2013, 2016; Wong, 2011, 2016; Wong & Lim, 2020; Wong, et al. 2021), the narrated delineated changes in industrial and socio-economic structure in this paper were made to some extent based on tacit understandings we have accumulated over the years. We plotted trading and investment trends via data extracted from the Malaysian Investment Development Authority (MIDA), World Bank and World Trade Organization (WTO) databases to develop our observations and support points of view. Our fieldworks were built

generally based on onsite interaction with Malaysia's government officials from various departments, industrial stakeholders and think tanks. We reconstructed these works to provide plausible explanation to the academic inquiry and known outcomes we wish to address for this paper.

The next section provides background information on the Malaysian economy. It also reviews several strands of works covering the middle-income trap. Then, the paper focuses on three main facets of the Malaysian middle-income trap: industrial competitiveness, state–business coalition and educational attainment. Subsequently, the paper discusses the wider implications of these three features of the trap. The last section concludes with a summary of the main arguments and suggests avenues for future research.

2. Literature Review: The Middle-Income Trap and Malaysia

Lee (2013, pp. 142–145) argued that some countries were trapped at middle income level as their comparative advantages were derived from resource endowment and industrial upgrading scope was dependent on technologies that were owned by foreign firms. A developing economy endowed with low labour cost advantage may be able to overcome its early productivity issues by forming training institutions to coordinate basic technological learning and disseminating knowledge useful for productive activities to the working population. While it may gain from improvement of labour-intensive based productivity, it would face exhaustion of its comparative edge due to rising wages. As such, the economy will be impeded from advancing further. To make a technological "turning point" and break the middle-income trap, an economy should develop capability in short-cycle (emerging) technologies. Short cycle technologies provide developing nations more opportunity to search and configure niches. It enables a developing economy to leapfrog the dominant technologies and create new growth prospects by commanding its configured niches in the global production value chain (GVC). To break the middle-income trap, Lee (2021) maintained that "what matters more critically are who captures and how to capture the bigger share of the value in the GVC" (p. 226). China and South Korea at their respective phase of technological catching-up increased the share of domestic value-added in their exports. They witnessed a period of significant decline in foreign value-added content of export as they paved the way to create domestic value chains. Such localisation drive allowed an emergence of flagship domestic companies that led and commanded their network of global production and marketing.

According to Kohli (2009), industrial underdevelopment was attributable to the issue of national political formations. Many underdeveloped economies in Latin America were deterred from rapid industrialisation relative to the Asian economies as their growth were dependent on the availability of foreign capital. They embraced development policies based on Washington Consensus while nationalist states of Asia (e.g. South Korea, Taiwan, etc.) coped and took advantages of globalisation based on their economic relative strengths. The competitive strengths of some Asian economies were found valuable as bargaining chips in making concessions with powerful economies when necessary. As such, they utilised productive activities to moderate income

inequalities and eventually propagated their growth agendas. In a similar vein of thought,[2] a review of Malaysia's middle-income trap by Raj-Reichert (2020) highlighted the issues of dependencies in foreign investment and low waged foreign workers for exporting activities. Related prior studies supporting such review, amongst others, include Narayanan and Lai (2014), Rasiah et al. (2014) and Rasiah et al. (2015).

Distinctively, Ohno (2013) attributed Malaysia's middle-income trap to the governance and policy process. He argued that the industrial upgrading policy in Malaysia was overly bureaucratised and unconnected to the industrial world. It gained low response from the private firms to commit in envisioned productive and upgrading agendas. Such mismatch as Ohno (2013) maintained, was due to unrealistic policy targets and overly complicated development plans (see pp. 228–229). The policy was learned to have been driven by the natural instinct of intelligent government officials and it was being run with a risk of increasing the gap between aspiration of the government and what private businesses could actually deliver.

Lall (1996, pp. 41–42) maintained the way to achieve effective human capital development for industrialisation was by imparting productive related skills via the formal education and training system. He saw the role of primary and secondary schooling to endow the population with basic "shop-floor" capabilities while a sophisticated training system was instrumental when industrial specialisation grew. An education system producing design and research expertise was crucial as the industrial structure of an economy developed. Some developed nations in Asia (Singapore and South Korea) gained from the rapid industrialisation in the 1980s and 1990s via producing skills that complement their evolving industrial structures and bridging engineering and scientific knowledge to populate new industries. Dutrénit et al. (2011) shared a similar line of thought about industrial development and mapped a co-evolutionary process between human capital development (variables include graduates, teaching and learning activities, and education and research infrastructures) and industrialisation (venture capital, innovative firms, sales associated with new products, etc.).

The above views inform more contemporary research, with Doner and Schneider's (2016) thesis as one of the most influential, on the middle-income trap. Their underlying position is that breaking through the trap necessitates an upgrading coalition, which in turn requires the economy in question to overcome major institutional and political challenges. In other words, escaping the middle-income trap is fundamentally 'more politics than economics'. To build on Doner and Schneider (2016), this paper provides a context-rich angle on the structural issues undergirding the Malaysian political economy. In particular, the discussion focuses on three key facets:

1) Industrial competitiveness – This facet sought to elucidate the phenomenon when Malaysia was facing a shortage of low-cost labour workforce and thus losing its ability to attract FDI. It bridged the middle-income trap continuity with a cause that transpired when Malaysia resorted to import of low skilled migrant workers to fill in the gap of low-cost labour workforce. While palm oil

[2] However, Malaysia is seen as one of the favourable cases in Kohli (2009) in terms of exporting and success in economic development.

in Malaysia witnessed a path of industrial upgrading, technological upgrading of many other productive industries had been patchy (see Wong and Cheong, 2014, pp. 386–389).

2) State-business coalition – This facet is used to explain the reasons behind the failure of the state in triggering interest of the locally owned private businesses to upgrade, mobilise and command productive activities while MNCs were relocating. This laid a ground for this paper to elaborate why domestic direct investment (DDI) was overwhelming in the servicing sector at the time when essentially no local big businesses were interested in searching and building niches in the global production value chain.
3) Education and labour market – It is sensible to argue that access to education played an important role in socio-economic development. It endows the population with general capabilities to allow them to gain some control in the labour market environment. With this point in view, Malaysia had instituted to spend a significant share of its public budget in both basic and higher education. The education push, however, did not lead to a critical mass of skilled workforce to populate new productive-emerging industries that enabled Malaysia to break the middle-income trap. There are studies that examined this functional inertia by questioning the ability of institutions that were trusted and endowed to deliver education services (Gomez et al., 2021; Lee, 2012). While such observation is valid, the structural inertia that locks-in what is essentially a poor quality education system is rarely discussed. The third facet in this paper reasons why education expenditure-push initiatives would not automatically pave a path towards new industries.

3. Industrial Competitiveness

Malaysia's rapid industrialisation in the early 1970s transpired when MNCs from the developed world sought to take advantage of low labour cost economies to develop their global supply chain. Intel and Motorola from the US, Matsushita and SEH from Japan and Siemens and MEMC from Germany were among the pioneers that relocated their manufacturing activities to Malaysia in the 1970s (Hobday, 1999, p. 83). The productive-oriented FDI growth period lasted for almost three decades. It witnessed successive contributions of FDI from a few developed nations in the 1970s to a mix of multiple nations which included investment from Singapore, South Korea and Taiwan in the 1980s and 1990s after the signing of the Plaza Accord currency exchange rate agreement. Malaysia realised the risk of over dependence on FDI for productive activities in the 1980s and had experimented targeted industrial policy (Gomez et al., 2017, p. 39). On one hand, implementation of this policy created economic rents to allow selected private firms to scale up and diversify their businesses with the intention to obtain economies of scale and scope in strategic sectors. On the other hand, the government endowed significantly in government link companies (GLCs) to pursue joint ventures with foreign firms to acquire technical know-how to develop indigenous industries for steel, automotive and cement production. Other targeted efforts (Jomo

et al., 2003) included incentives for exporting of processed agricultural products while discouraging exporting of non-processed and raw materials, and funding for local firms involved in short cycle kind of technological businesses[3] (e.g. semiconductor).

China's increasing appeal for FDI gained momentum in the 1990s and continued to grow in the 2000s, as numerous MNCs aimed to establish supply chains in China to tap the international and its vast domestic markets. Various MNCs hitherto exploiting Malaysia's low labour cost also relocated to China. Seeing itself losing ground for productive kind of FDI, Malaysia resorted to import low skilled migrant workers to fill the gap in the supply of low-cost labour and persuaded some MNCs to retain their operations in Malaysia by offering generous subsidies as compensation. Malaysia did not perceive the situation would need an urgent fix as it was seen to be an unlikely cause leading to a disastrous economic outcome in short-term development. The Malaysian economy was gaining from exporting mining related products[4] and the loss in the productive type of FDI was compensated by interests from China, Singapore, Japan and Korea to gain from the expansion of mining, transportation and other service-related businesses. By 2011, the productivity growth rate in manufacturing was 2% and it was very much attributable to petroleum products (10.7%). The growth rate in electrical and electronics, the sector committed by MNCs for the exporting market, gained only 2% (see MPC, 2012, p. 160).

The FDI in 2000s in general was trending upwards and growth for foreign investment increased as mining and service related investments compensated for the losing momentum in the productive kind of FDI. In the 2000s, both local and foreign firms started to commit in building non-manufacturing activities[5] (e.g. sales and procurement, call centres, and warehousing and logistics to transport goods in Southeast Asia) to take advantage of Malaysia's strategic logistic locations for exporting activities and exploit the relatively low labour cost for servicing in Malaysia. The Malaysian government at that time (2003–2009 under Abdullah Badawi administration) mobilised DDI to prepare local SMEs to fill the gap in manufacturing activities. However, the mobilised funding for productive activities was small compared to that for real estates and construction. While the government acknowledged the role of SMEs in developing new industries, the eventual funding agendas at that time was very much on the track of investing in high return servicing sector. The returns to shareholders of many GLCs

[3] This commitment was in response to the idea of promoting businesses involved in short cycle technologies to break the non-committal investment for new industries cycle in middle-income trapped economies (Lee, 2013, pp. 207–222).

[4] For instance, the share of investment for manufacturing expansion such as electrical and electronics and basic metal products between 2008 and 2009 shrank from 35.3% to 29.5% and 22.9% to 18.8%, respectively (MIDA 2009, pp. 11–12). On the other hand, the share of servicing and mining related industries such as transport and petro-chemicals increased from 6.4% to 8.1% and 6.5% to 9.3%, respectively. Total foreign direct investment in 2009 was RM14.6 billion (about 3.65 billion USD) with a share of 75% of total investment.

[5] Approved investment for the service sector amounted to RM36.3 billion (MIDA, 2010). DDI dominated the share of investment (about 90%) in this sector. Major approvals included transport (RM7.9 billion, about USD1.9 billion), energy (RM6.8 billion, about USD1.7 billion), finance (RM4.3 billion, about USD1.0 billion), real estate (RM4.2 billion, about USD1.0 billion) and telecommunications (RM3.8 billion, about USD0.9 billion).

were benchmarked with the overall market performance and GLCs were asked to improve their performance as their market capitalisation was almost equal to half of the economy size (Gomez et al., 2017, p. 39). Khazanah, the national sovereign wealth fund holding RM140 billion (about USD35 billion), and the Malaysian Employees' Provident Fund (EPF) holding RM200 billion (about USD50 billion) worth of assets in 2004, were then driven to invest in lucrative servicing-oriented businesses locally and abroad. Many servicing-based companies such as banking, real estate, etc. were backed with significant funding for expansion while the industrial enabler such as MAVCAP, the Malaysian venture capital (VC) funding agency, was endowed with only RM500 million (about USD125 million) in 2001 to fund technological activities (Lyons & Kenney, 2007). The funded technological start-ups suffered not only from the insignificant funding size but also from the lack of VC firm's expertise support in facilitating learning in a technological market and in connecting their niches to the global production value chain. As services triumph, SMEs were cornered to invest in some low-cost servicing related ventures, usually related to tourism activities. Productivity in tourism in 2008 was 7.51% (MPC, 2012) and the growth for labour cost per employee was 9.39%. The marginal return between productivity and labour cost in tourism was relatively uniform. This fairly open industry attracted many of those without state-business ties to invest and develop businesses.

As no significant measure was taken to develop the productive industries, Malaysia in the 2010s did not enjoy a sustained boost in its competitiveness. Perhaps reflecting this uneven performance, Malaysia witnessed a general down trend in the inflow of FDI (Figure 2). Malaysia's economy, to a large extent, was trapped as it was neither able to offer MNCs low-cost labour for manufacturing nor capable of commanding state-of-the-art technologies to become an indispensable producer in the global production

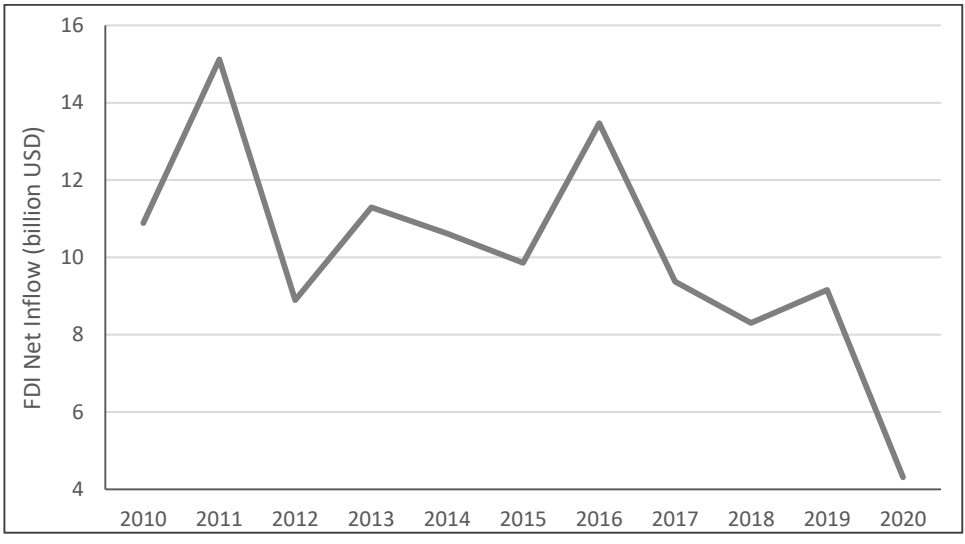

Figure 2. Malaysia's FDI inflow, 2010–2020 (USD, current)
Source: World Bank.

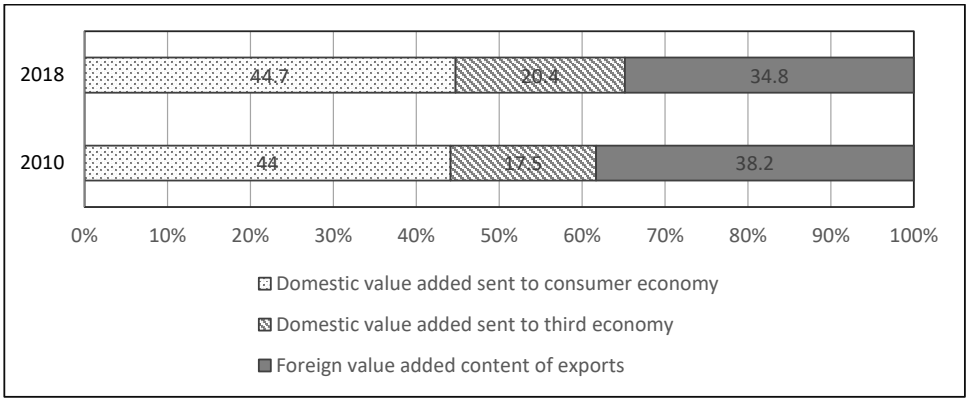

Figure 3. Value-added components of gross exports, 2010 and 2018
Source: World Trade Organization.

value chain. Unlike South Korea and China in their technological catching-up phase of development (see Lee 2021, p. 227), Malaysia's DDI did not lead a meaningful increase of domestic value chain sent to consumer economy. It saw only an insignificant increase from 44.0% in 2010 to 44.7% in 2018 (Figure 3) for its share of domestic value chain sent to consumer economy in total gross exports.[6] There were more and more MNCs relocated to many populous developing large countries (e.g. Indonesia, Vietnam, etc.) as they offered both low-cost labour and market opportunities. Malaysia's economy was then forced to depend more on natural resources and agricultural exports to fuel growth. Manufacturing value adding on these products were limited, resulting in many studies to observe serious deindustrialisation (see Gomez et al., 2021; Wong et al., 2021).

Malaysia also witnessed a noticeable FDI inflow from China in the 2010s.[7] For instance, China had an approved FDI worth of RM15.3 billion (about USD3.8 billion, 28% of total FDI) in 2019 followed by the US (RM14.2 billion, about USD3.5 billion), Singapore (RM5.6 billion, about USD1.4 billion), Taiwan (RM5.2 billion, about USD1.3 billion), and Japan (RM3.7 billion, about USD0.9 billion). China's visible investment abroad was attributable to its interest to accomplish a global infrastructure for road, rail and sea route transportations under its "Belt and Road Initiative" (BRI) since 2013. This courted Malaysia's interest and the then government mobilised its GLCs to work closely with state-owned enterprises in China. This then led to the state–state based business ventures and a majority of these ventures were driven by construction and infrastructure projects (Gomez et al., 2020; Liu & Lim, 2019). According to the investment tracking by China Global Investment Tracker,[8] China committed about USD19.4 billion of investment in Malaysia from 2010 to 2021. It is observed that 65% of this investment was oriented to energy-, transport- and real estate-based ventures. This

[6] Data is obtained from the World Trade Organization (WTO)'s report on trade in value added and global value chains. Accessed on April 01, 2022 at https://www.wto.org/english/res_e/statis_e/miwi_e/MY_e.pdf
[7] The data is obtained from various MIDA reports.
[8] Accessed on April 01, 2022 at https://www.aei.org/china-global-investment-tracker/

FDI inflow from China did not lead Malaysia to develop foreign value-added content of exports. Malaysia instead experienced a contraction from 38.2% in 2010 to 34.8% in 2018 in its foreign value-added content in total gross exports (Figure 3). The contraction was compensated by domestic value added sent to third economies, which increased from 17.5% in 2010 to 20.4% in 2018. This was partly attributable to many firms from East Asian economies that navigated their trade routes during the onset of the trade conflict between the US and China by committing some low value-added activities in Malaysia before exporting their goods and products to the Western shores.

In mid 2010s, Malaysia's labour-intensive industrial competitiveness was challenged with the rising use of technologies under Industry 4.0 globally. There were cases about MNCs being enticed and incentivised by their home countries to reshore their manufacturing activities. The reshoring back to the rich world was a phenomenon that was driven by the plummeting cost of automation and robotics, with significant repercussion to the developing nations. As Malaysia was slow in adopting the technologies and utilising them to fashion the endogenous change, it witnessed significant reshoring of multinational firms when the global Covid-19 pandemic crisis exacerbated the return of low value-added multinational manufacturing activities back to their home countries (Wong et al., 2021). The frequent manufacturing disruptions in Malaysia due to movement control orders to contain the outbreak in 2020 and 2021 led the once hesitant MNCs to change their mind and reshored. Many others had servitised their operations by relocating manufacturing while switching their businesses in Malaysia to focus more on servicing activities such as logistics and warehousing and supporting customer services.

The pandemic crisis since 2020 has impoverished the Malaysian economy. The Malaysian government realised that a number of MNCs were seeking for distribution hubs to advance their e-commerce businesses in Southeast Asia. With a tight development budget, the Malaysian government launched a series of horizontal technology policies (e.g. laying 5G Internet infrastructure, distributing smart devices for gig workers, etc.) since 2020 with the assumption that such measures will endow the population as well as those made redundant due to pandemic-led economic downturn with basic skills to benefit from the e-commerce and trendy servitisation in MNCs. These horizontal policies would likely lead to a rising informal economy as many in the working population were driven to work as (low skilled) informal gig workers. The hope to facilitate greater Malaysian involvement in high tech manufacturing and defining niches in global production value chain is dim. This phenomenon is alarming and the prospect of breaking the middle-income trap and achieving a developed status in economic development via defining and developing indigenous technological competencies is feeble.

4. State–Business Coalition

Numerous studies, including those by Felker and Jomo (2007), Jomo et al. (2003) and Lall (1996) commended the Malaysian government for experimenting various industrial policies. The Malaysian government in general pursued two tracks of industrial upgrading during the past decades. On one track we observed the local governments

were driven to facilitate the MNCs in Malaysia to scale up their operations. They worked closely with the MNCs to identify the skills needed for blue collar workers to operate and maintaining machines and managing manufacturing process. Blue collar workers were then empowered with skills and knowledge via training programs coordinated by local–MNCs coalition involving the MNCs, local SMEs, the state government and universities (Lee et al., 2020; Wong et al., 2022). The success of Penang's electrical and electronic cluster since the 1970s was particularly germane (Best, 2007). However, such an upgrading coalition has hardly brought about a higher level of value-added (e.g. designing and R&D) as MNCs were reluctant to relocate their most valuable operations to developing economies with less-than-conducive business conditions. For many decades the incentive-based policy[9] was used to lure FDI for productive and exporting activities in Malaysia. Over time, it witnessed a waning effect and less and less responses from the MNCs as they were overwhelmed with better offers from other countries in the Southeast Asian region.

On the other track, Malaysia pursued a tripartite coalition involving the federal government, financial institutions and local business groups to pursue short(er)-cycle emerging technological ventures that were deemed instrumental to break the middle-income trap. The federal government of Malaysia in the mid-1980s experimented with an industrial policy that allowed it to "pick winners" via deliberated government assets privatisation crusade. The assets were generally channelled to the politically well-connected business people (Gomez et al., 2017, pp. 38–39) as the government deemed that there is a need to have them gaining in economies of scale and scope before "instructing" them to venture in high tech and high-risk businesses. The well-connected business groups diversified but a significant share of their ventures was owned by GLCs. GLCs with significant investing capitals were made influential as the government hope to mobilise resources to industries (e.g. steel, automotive and semiconductor) that were deemed important for long-term industrial development. The 1990s of Malaysia witnessed the failure of these ventures to make an impact in the global production value chain. The ventures were started with limited technological expertise and the manufactured products were outdated if not obsolete. They were procured and distributed at the local (protected) market. To a large extent, their business survivability was dependent on prolonged government protection (e.g. tariff for imported products) and their enterprises were in constant need of government support.

In the 2000s, the general public and the government were becoming frustrated with the financial performance of the GLCs and their generally less-than-successful joint ventures (Gomez et al., 2017, pp. 54–55). The government had them benchmark their performance with that of the private sector. It was willing to offer salaries and bonuses that matched the private side to attract the talented investment managers and professionals. This drive pushed the GLCs to find new allies to invest in lucrative businesses that enabled them to gain financially in the short term. The then government

[9] Malaysia was offering zero percent tax rate for 10 years for new business entities that are willing to invest at least RM300 million in the manufacturing sector in Malaysia. While the relocation of MNCs to Malaysia may generate exporting activities and jobs, it indirectly deprived the nation of much needed tax revenue. The incentive was also in contradiction of the effective minimum global corporate tax rate of 15%.

fostered its development plan by upholding the idea of "knowledge-based economy" basically to inculcate economic activities towards the servicing sector and legitimise the restructuring of government rents to allow GLCs to find and form new allies. Khazanah, for instance, divested its productive assets and mobilised them to co-invest with private firms in banking, healthcare, leisure and tourism, and real estates. GLCs also mobilised the EPF to co-fund with private firms in lucrative real estate businesses locally and abroad. There were allegedly well-connected business people and politically influential figures who captured rents during this period (see Gomez & Jomo, 1999). While there were initiatives and supports to empower productive SMEs, they were miniscule compared to the rents for well-connected servicing firms to co-drive the lucrative businesses. This in turn drove many SMEs to build low value adding servicing businesses (e.g. subcontracting jobs for cleaning and maintenance, travel driving for tourists, etc.) that had to endure the overly competitive business environment and grim prospect for business development.

Towards the 2010s, upgrading of related policies were seen no other than an instrument to incentivise MNCs and local firms if they invested and adopted advanced machines (purchased assets) for productive use in Malaysia. They were generic and horizontal (lack of priority setting), non-explicit (lack of coordination between the state agencies and the industries and sometimes led to biases in funding) and non-systemic in nature. The policies failed to trigger general interest from the private firms to upgrade nor were they mobilised to command productive industries when existing MNCs were relocating. On the other hand, DDI from both GLCs and business groups in the lucrative servicing sector was overwhelming but it was not utilised effectively to cultivate local firms to search and build niches in the global production value chain. The government owned financial–commercial assets endowed to function as industrial enablers and to fund productive–high technological activities were small compared to that of the sovereign (Khazanah) and pension funds. Both pension and sovereign funds (Gomez et al., 2017, pp. 99–139) were driving the servicing sector in Malaysia and made noticeable acquisitions abroad (e.g. real estates, banking, utilities, oil and gas, etc.). To get a sense of the difference, Malaysia's private equity and venture capital fund size[10] in 2020 was RM11.7 billion (about USD2.9 billion). This is significantly small compared to Khazanah's total market capitalisation of seven performing companies[11] (RM150 billion, about USD37.5 billion) and EPF's owned assets[12] (RM1 trillion, about USD250 billion) in 2020. As funding was overwhelmingly concentrated in the non-productive and non-high-tech industries, it cast out high-tech start-ups and held back the growth of productive firms in the Malaysian economy.

In the Malaysian context, the government generally has to demonstrate that it plays a role in (high value-adding) job creation. The 2010s of Malaysia saw a proliferation of servicing activities in the economy. While DDI contributed to this phenomenon, there

[10] Information available at https://www.capitalmarketsmalaysia.com/private-equity-venture-capital/. Accessed on April 07, 2022.

[11] Information available at https://themalaysianreserve.com/2020/03/23/khazanah-stocks-lose-rm38b-in-market-value-since-march-1/. Accessed on April 07, 2022.

[12] Information available at https://www.businesstimes.com.sg/banking-finance/malaysian-pension-fund-epf-assets-grow-to-value-of-rm102-trillion-in-2020. Accessed on April 07, 2022.

was also a rising FDI from MNCs to lay their servicing bases in Malaysia. Companies such as Alibaba of China was investing in Malaysia to boost its e-commerce businesses in Southeast Asia. It committed to develop modular warehousing with extensive use of cloud-based logistics in sorting, shifting, packaging and moving merchandise in its smart warehousing facilities (Wong et al., 2021). As the Fourth Industrial Revolution (4IR) and thus deindustrialisation and declining prospects in attracting FDIs are evident in Malaysia, the general upgrading policy framework has the goal of diffusing general IT skills to a critical mass of the population, while simultaneously aligning this goal with its state–business ventures. Malaysia is banking on the 5G infrastructure to "servitise" the productive sector (e.g. build a conducive environment for business expansion of e-commerce firms) and envisions the gig economy to absorb any redundancy in the labour market.

The tripartite coalition, on the other hand, were scaling up to secure favourable rents from the government to gain the rights to access certain important technologies and distribute them to the market. The cases of Internet connectivity infrastructure, rail and pharmaceutical businesses were particularly germane (see Figure 4). The resourceful GLCs (such as Telekom, KTM, Pharmaniaga, etc.) and business groups (such as MMC, Gamuda, etc.) were expanding by subscribing to essential technologies (e.g. technologies to build 5G infrastructure or rolling stock for rail) while securing government endowed projects to distribute and provide the services to the consumers. The tripartite collation gained control of the distribution channels via investing in crucial logistic and construction facilities to obtain (a rather long period of) concession agreement from the government. The SMEs usually were operating at the lowest level in the value chains – struggling to make ends meet as their businesses operate on narrow profit margins. While the business groups and GLCs gained from such preferential access to the consumer market, they rarely invested in backward integration nor were committed to technological learning and eventually participating in the global advanced technological systems production. As we observed in the previous sub-section, DDI led to little domestic value added sent to the consumer economy. The tripartite coalition fueled the growth of well-connected firms, many of which diversified from their core commercial goals and transformed increasingly into portfolio-centric business groups. Portfolio-driven business groups tended to buy firms rather than building them via a systemic fashion (Schneider, 2009, p. 187). The businesses being bought by portfolio groups in many cases could be unrelated to their other businesses. Such conditions incapacitated Malaysia to configure indigenous technological capabilities and develop new and emerging industries.

5. Education and Labour Market

Access to education is largely not an issue in Malaysia. Malaysia spent about 4.1% of its GDP in 2019 on education,[13] comparable to that of South Korea (4.3% in 2017). It had 104% primary school enrolment, 83% for secondary and 43% for tertiary

[13] Information available at https://data.worldbank.org/indicator/SE.SEC.ENRR?locations=MY-KR. Accessed on April 12, 2022.

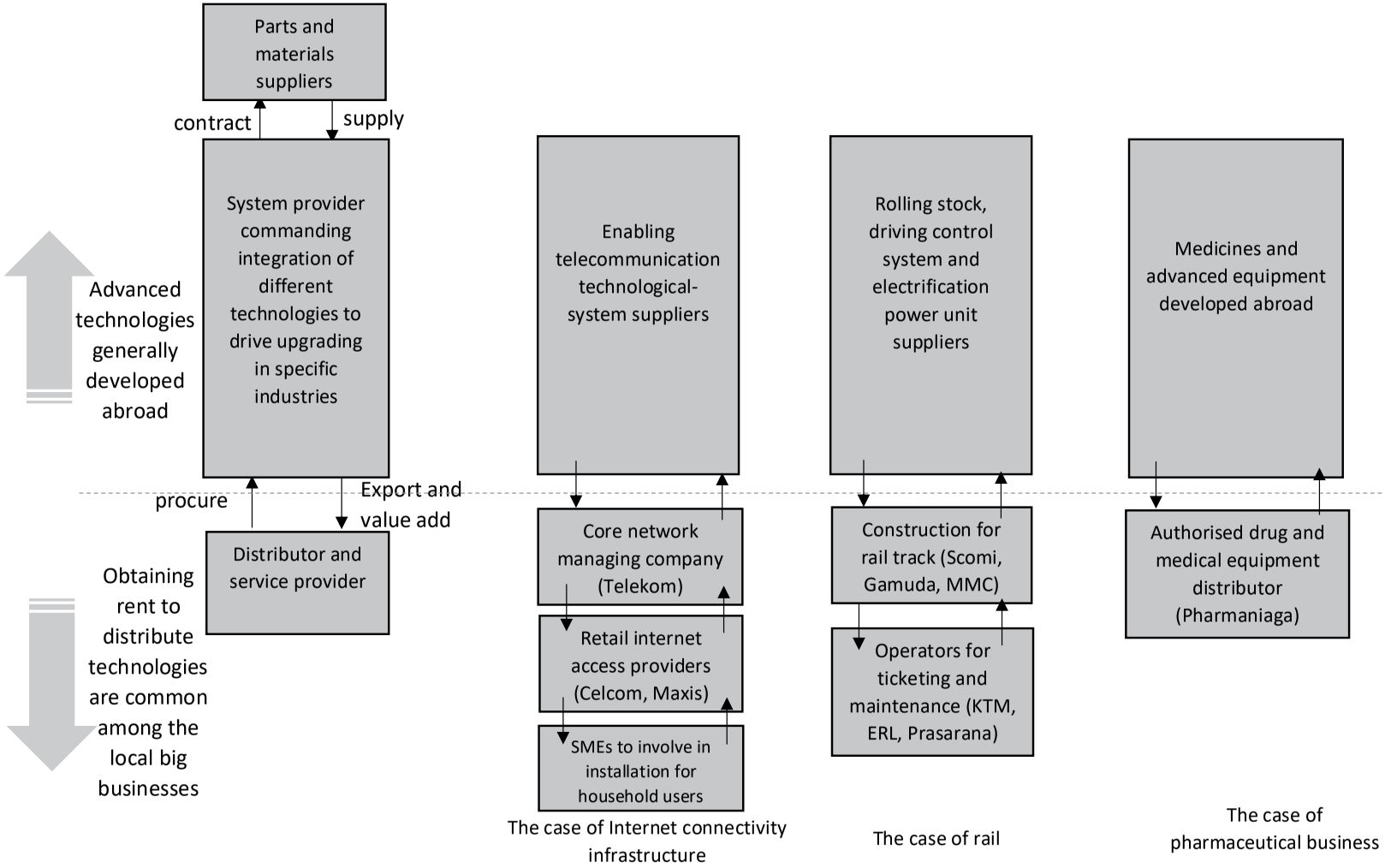

Figure 4. Value chains for selected industries in Malaysia

education in 2019. Except its performance for tertiary school enrolment, Malaysia achieved comparable performance relative to many advanced nations. Indeed, the recent concern about the waning number in STEM (science, technology, engineering and mathematics) students shall not be deemed a substantial issue for the labour workforce. At a glance, only 44% of Malaysia's high schoolers chose the STEM streams in 2019 compared to 48% in 2012.[14] For higher education, 334,742 (36%) students enrolled for STEM related fields in 2017 while 570,857 (64%) majored in arts, education, humanities, business and social sciences. Despite these statistics, Malaysia had a comparable proportion of science and technology graduates compared to many developed nations. For comparison, South Korea witnessed 34% in STEM enrolment in 2017 while the OECD countries on average only achieved 27% (OECD, 2019).

The major problem the nation is facing is probably not so much about the provision issues of STEM education or the lacking of STEM students in higher education. It is more about the inability to improve the quality of education, particularly science and technology related education. Malaysia's performance in the mean Programme for International Student Assessment (PISA) scores (see Table 1) in 2018 for reading (415), mathematics (440) and science (438) remain well below the level achieved by the OECD nations (e.g. Latvia, despite lagging behind other OECD countries, achieved 479, 498 and 487 for reading, mathematics and science, respectively). The tiger economies in Asia such as Taiwan achieved a high share of top performers, with 26% of their 15-year-old population achieving level 5 and 6 (high level of reading comprehension) standards; only 9% of this population was at level 2 or below. Malaysia, on the other hand, witnessed only 2.7% of its 15-year-old population achieving level 5 and 6, while 27.8% are underperformers particularly in mathematics and science.

The underwhelming education performance in Malaysia has many attributing facets of its own. Many studies attributed this to education governance failure (e.g. Cheong 2016, pp. 2264–2265; Gomez et al., 2021; Lee, 2012). However, one that is

Table 1. Mean score in PISA tests for selected nations, 2018

	Mean score			Top performing or low achieving students	
	Reading	Mathematics	Science	% of top performers (level 5 or 6)	% of low achievers in all three subjects (below level 2)
Singapore	549	569	551	43.4	4.1
Chinese Taipei (Taiwan)	503	531	516	26.0	9.0
OECD average	487	489	489	15.7	13.4
Malaysia	415	440	429	2.7	27.8

Source: OECD (2018).

[14] Information available at https://www.malaymail.com/news/malaysia/2019/09/27/ministry-decline-in-students-opting-for-stem-subjects-concerning/1794928. Accessed on April 11, 2022.

rarely discussed in the literature is the labour market's lack of demand for science and technology-related skills.

To start, the Malaysian government from time to time motivated and pushed high schoolers to appreciate and learn science and technology (S&T) knowledge. It is believed that the efforts to cultivate interests and encourage them to enrol and major in S&T related studies would ultimately populate a workforce that is capable of contributing to science-based industries (e.g. biotechnology, semiconductor, etc.). However, the labour market itself rarely manifested the need for such skills and knowledge. This is particularly germane to many multinational operations (including manufacturing businesses in high tech clusters such as Penang) which were performing the lower back-end functions (e.g. testing and packaging in electrical and electronics) of the global supply chain (Lee et al., 2020, pp. 414–415; Wong et al., 2022, p. 10). Their rather established and routinised operations did not necessarily need a critical mass of science and technology graduates who carried with them analytical skills and knowledge for research activities. Meanwhile, private portfolio firms and GLCs rarely commit in venturing into emerging (and risky) high tech businesses. Their businesses (e.g. construction and property development) generally demanded general skills in the labour market (Cheong et al., 2016, pp. 2260, 2263). However, like MNCs, they did not need graduates with scientific research and design skills to search for and build science-based niches.

Simply providing education by the public sector, without a clear indication of the science and technology-related skills demanded in the job market, is a hopeful but unrealistic attempt to attract high-tech foreign investment and promote industrial upgrading. Functional coalition between industries and education institutions to endow skills for front end industrial operations (e.g. designing in semiconductor operations or research in biotechnology) were rare, if not non-existent. As a result, Malaysian graduates (STEM or otherwise) continued to face skills mismatch in the labour market, which indirectly depressed their wage levels.

This is in contrast to the labour market in Taiwan. Demands for certain front-end related S&T skills were clearly indicated. This is certainly attributable to its well-coordinated governing and national innovation systems (Lee & von Tunzelmann, 2005; Wade, 1990), established industrial structure to elaborate certain front-end industrial skills (Wong et al., 2015, pp. 376–382), and commanding power in the global production value chain for semiconductor products and services. The graduates endowed with S&T knowledge were highly sought after. The average salaries[15] for those with science and engineering knowledge and related skills (e.g. engineer) were paid relatively higher than those in the servicing sector (e.g. banker). Many of the top S&T graduates were absorbed in productive firms to perform high value-added activities and were offered high salary, while some who were interested to create high tech start-up were endowed with funding in the innovation ecosystem (see Ng et al., 2019). This led to a clear market indication for S&T knowledge. Functional ties between industries

[15] A benchmark can be made at http://www.salaryexplorer.com/salary-survey.php?loc=212&loctype=1&job=22&jobtype=1. Accessed on April 22, 2022.

and education institutions for education provision were visible. Many S&T laboratories in the universities were co-funded by the government and industries. The laboratories were equipped with state-of-the-art technologies and co-governed by academics and R&D workforces from the industries. The laboratories were built to propagate both educational activities and industrial-oriented research. As such, S&T students learning in the laboratories get to acquire both industrial front-end skills and networks.

For the case of Malaysia, education institutions tasked to train front-end industrial skills tend to impart academic textbook-based explicit knowledge to students, and not via associative learning in a conducive industrial environment. Such conduct of knowledge transfer can be seen as an issue as students cannot relate the textbook knowledge to the front-end industrial problems.

Graduates endowed with this textbook-based explicit knowledge often face dilemma in finding relevant jobs in the labour market. There are not many firms in Malaysia demanding this kind of know-how. Many educated with S&T knowledge tended to end up taking jobs related to the servicing-based professions (e.g. sales, administration, etc.). The resulting job mismatch led to some top S&T graduates migrating abroad (Foo, 2011, p. 106; Wong et al., 2019, p. 107) to seek better job prospects – a scenario that is quite telling (particularly to high schoolers) about the risk of investing time to obtain scientific and technological knowledge. As such, the labour market structure and the lack of indications for science and technology related skills hampered Malaysia's ability to upgrade and develop emerging industries to break out of the middle-income trap.

6. Discussion

This paper shed light on the structural inertias that hampered Malaysia in building new competitive advantages, and they were presented along three dimensions. On the competitiveness front, we learned that Malaysia lost its commitment in pursuing productive and high-tech industries. Instead of nurturing new activities to progressively capture more value-added from the production and sales of increasingly complex goods and services, it opted to preserve old routines. It also resorted to short-term fix by importing low skilled employees, entrenching the nation further in its decades-old strategy of exploiting cheap (and low skilled) labour as well as hindering its adoption of more sophisticated activities. To make matters worse, an arguably expedient approach was seen in Malaysia's promotion of the gig economy.

As far as business coalitions were concerned, we observed that the GLCs – since at least the 2000s – focused increasingly more on financial performances. These GLCs, in their race to enhance financial returns, mobilised DDI and partnered with portfolio firms to invest in high-revenue service industries. However, such an emphasis on servicing activities surpassed (or even depressed) investment in more productive ones. This imbalance resulted in a lack of interest from major local business groups in exploring and establishing niches in the global value chain of critical industries.

On education, our prognosis was that the nation's rote learning-based approach lacked effectiveness in addressing real-world industrial issues. As such, MNCs opting to maintain (or even prioritise) lower value-added activities found little incentive to

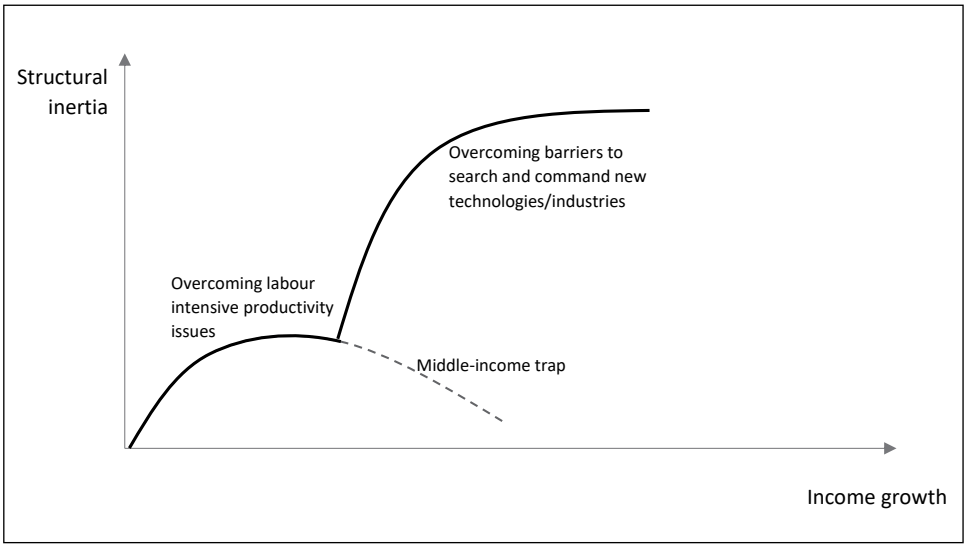

Figure 5. Socio-economic structural inertia and income growth

upgrade itself and the broader tripartite coalition. The knock-on effect was that highly skilled graduates in science and technology, as well as SMEs aiming for high-tech industries, faced limited opportunities to access new technologies or sectors (see Figure 5). Some talented individuals, finding the effort to develop high-tech business prospects in Malaysia more troublesome than worthwhile, sought greener pastures overseas.

As Malaysia enters the second half of the 2020s, it is likely to witness growth in FDI inflow as economic exchange between China and the US is routed via third countries like itself. While taking advantage of its location to attract firms (particularly those from China) buffering themselves from the intensifying US-China geoeconomic competition is not a negative strategy, it might inadvertently deepen Malaysia's reliance on labour-intensive low value-added investment such as semiconductor testing and packaging. Worse, such investment might prevent Malaysia from developing higher order value-added activities and fostering flagship firms to command supplies and networks in critical industries.

While state action could theoretically overcome market failure, the GLCs and their associates had generally been geared towards capturing rents in highly regulated, non-tradable industries such as utility provision. Such a weak state-business alliance not only discouraged investment in long-term productive activities, but also relegated Malaysia to a virtual bystander in the realm of high value-added global production networks. In addition, the coalition's embrace of (or at least ambivalence towards) the gig economy became somewhat synonymous with the nation's wider shift towards more precarious, informal work. Insecure work, unstable income, and skills atrophy put even more pressure on the education sector, including but not limited to complicating the relationship between science and technology education and labour market development.

7. Conclusion

This paper's overarching message is that the first step towards resolving the Malaysian middle-income trap is a deep understanding of multiple socio-economic issues outlined earlier. These issues are invariably intertwined and at least decades-old. As such, collective action from all parties (e.g. government, educational institutions, and business groups) is arguably the absolute minimum for the country to break the deadlock. To extend the knowledge paradigm and to enrich this special issue, we ask here: 'What would the late Kee Cheok (as he is affectionately known) make of the current juncture of the Malaysian economy?'

One of his works in the *Journal of Comparative Asian Development* offers some clues. In that paper, Wong and Cheong (2014) analysed several high-performing East Asian economies, illustrating how each nation developed its own unique institutions and mechanisms to foster economic growth over an extended period. Although each's pathway was *sui generis*, it was also clear that those achieving rapid growth managed to overcome various challenges such as information asymmetries. Additionally, Wong and Cheong (2014) highlighted the curious case of China. According to them, China represented a hybrid model, incorporating effective elements from other East Asian economies, including Malaysia. While its economic growth has decelerated recently, the reality is that China is still widely considered as the most probable Global South candidate, in the near to medium term at least, to overcome the middle-income trap.

China and Malaysia currently (and over the last several years) share similar income levels. They also face common challenges such as aging population and rural–urban divides. Given these similarities, future researchers would benefit from studying policy approaches that promote cross-learning between these two nations in a more systematic manner. The key agenda is to elucidate the multiplicity of options available and the actual policy instruments available, which in turn help them break out of the middle-income trap.

References

Best, M.H. (2007). Cluster dynamics in Malaysian electronics. In Jomo, K.S. (Ed.), *Malaysian industrial policy* (pp. 249–276). NUS Press.

Cheong, K-C., Hill, C., Fernandez-Chung, R., & Leong, Y-C. (2016). Employing the 'unemployable': Employer perceptions of Malaysian graduates. *Studies in Higher Education, 41*(12), 2253–2270. https://doi.org/10.1080/03075079.2015.1034260

Cimoli, M., Dosi, G., & Stiglitz, J.E. (Eds.). (2009). *Industrial policy and development: The political economy of capabilities accumulation*. Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199235261.001.0001

Doner, R.F., & Schneider, B.R. (2016). The middle-income trap: More politics than economics. *World Politics, 68*(4), 608–644. https://doi.org/10.1017/S0043887116000095

Dutrénit, G., Puchet Anyul, M., & Teubal, M. (2011). Building bridges between co-evolutionary approaches to science, technology and innovation and development economics: An interpretive model. *Innovation and Development, 1*(1), 51–74. https://doi.org/10.1080/2157930X.2010.551061

Felker, G., & Jomo, K.S. (2007). Investment policy in Malaysia. In Jomo, K.S. (Ed.), *Malaysian industrial policy* (pp. 56–81). NUS Press.

Foo, G. (2011). Quantifying the Malaysian brain drain and an investigation of its key determinants. *Malaysian Journal of Economic Studies, 48*(2), 93–116.

Gomez, E.T., & Jomo, K.S. (1999). *Malaysia's political economy: Politics, patronage and profits*. Cambridge University Press.

Gomez, E.T., Cheong, K.C., & Wong, C.Y. (2021). Regime changes, state-business ties and remaining in the middle-income trap: The case of Malaysia. *Journal of Contemporary Asia, 51*(5), 782–802. https://doi.org/10.1080/00472336.2021.1933138

Gomez, E.T., Padmanabhan, T., Kamaruddin, N., Bhalla, S., & Fisal, F. (2017). *Minister of Finance Incorporated: Ownership and control of corporate Malaysia*. Palgrave-Macmillan. https://doi.org/10.1007/978-981-10-4897-5

Gomez, E.T., Tham, S.Y., Li, R., & Cheong, K.C. (2020). *China in Malaysia: State-business relations and the new order of investment flows*. Palgrave Macmillan.

Gustafsson, R., & Autio, E. (2011). A failure trichotomy in knowledge exploration and exploitation. *Research Policy, 40*(6), 819–831. https://doi.org/10.1016/j.respol.2011.03.007

Hobday, M. (1999). Understanding innovation in electronics in Malaysia. In K.S. Jomo, G. Felker, & R. Rasiah (Eds.), *Industrial technology development in Malaysia: Industry and firm studies* (pp. 76–106). Routledge.

Jomo, K.S., Rasiah, R., Alavi, R., & Gopal, J. (2003). Industrial policy and the emergence of internationally competitive manufacturing firms in Malaysia. In K.S. Jomo (Ed.), *Manufacturing competitiveness in Asia: How internationally competitive national firms and industries developed in East Asia* (pp. 106¬–172). Routledge.

Kang, N., & Paus, E. (2020). The political economy of the middle income trap: The challenges of advancing innovation capabilities in Latin America, Asia and beyond. *Journal of Development Studies, 56*(4), 651–656. https://doi.org/10.1080/00220388.2019.1595601

Kohli, A. (2009). Nationalist versus dependent capitalist development: Alternate pathways of Asia and Latin America in a globalized world. *Studies in Comparative International Development, 44*, 386–410. https://doi.org/10.1007/s12116-009-9048-x

Lall, S. (1996). *Learning from the Asian Tigers: Studies in technology and industrial policy*. Palgrave Macmillan. https://doi.org/10.1057/9780230389892

Lee, H-A. (2012). Affirmative action in Malaysia: Education and employment outcomes since the 1990s. *Journal of Contemporary Asia, 42*(2), 230–254. https://doi.org/10.1080/09500782.2012.668350

Lee, K. (2013). *Schumpeterian analysis of economic catch-up: Knowledge, path-creation, and the middle-income trap*. Cambridge University Press. https://doi.org/10.1017/CBO9781107337244

Lee, K. (2021). *China's technological leapfrogging and economic catch-up: A Schumpeterian perspective*. Oxford University Press.

Lee, K., Wong, C.Y., Intarakumnerd, P., & Limapornvanich, C. (2020). Is the Fourth Industrial Revolution a window of opportunity for upgrading or reinforcing the middle-income trap? Asian model of development in Southeast Asia. *Journal of Economic Policy Reform, 23*(4), 408–425. https://doi.org/10.1080/17487870.2019.1565411

Lee, T.L., & von Tunzelmann, N. (2005). A dynamic analytic approach to national innovation systems: The IC industry in Taiwan. *Research Policy, 34*(4), 425–440. https://doi.org/10.1016/j.respol.2005.01.009

Liu H., & Lim G. (2019). The political economy of a rising China in Southeast Asia: Malaysia's response to the Belt and Road Initiative. *Journal of Contemporary China, 28*(116): 216–231. https://doi.org/10.1080/10670564.2018.1511393

Lyons, K., & Kenney, M. (2007). *Report to the World Bank on the Malaysian venture capital industry*. https://kenney.faculty.ucdavis.edu/wp-content/uploads/sites/332/2016/03/world-bank-malaysia_vc_report.pdf

MIDA. (2009). *Prestasi sektor perkilangan dan perkhidmatan 2009*. Malaysia Investment Development Authority (MIDA) (in Malay). https://www.mida.gov.my/wp-content/uploads/2020/12/20140126135044_slides2009bm.pdf

MIDA. (2010). Media statement at the annual conference on the performance of the manufacturing and services sector in 2009 by YB Dato Sri Mustapa bin Mohamed on 4 February 2010. https://www.mida.gov.my/wp-content/uploads/2020/12/20140126043241_E2009ms.pdf

Ministry of Science, Technology and Innovation (MOSTI). (2016). *Bibliometric study 2015: Science and technology knowledge productivity in Malaysia, 2016*. https://library.mosti.gov.my/cgi-bin/koha/opac-detail.pl?biblionumber=27504

MOSTI. (2013). *Study of research performance and impact of R,D&C program of 9th Malaysia Plan*. Report prepared for the Ministry of Science, Technology and Innovation (MOSTI) of Malaysia to assess its R&D programs.

MPC. (2012). *Productivity report 2011/2012*. Malaysia Productivity Corporation. https://irp.cdn-website.com/9c99ef26/files/uploaded/Productivity-Report-2011_12-270ee451.pdf

Narayanan, S., & Lai, Y.-W. (2014). Immigrant labor and industrial upgrading in Malaysia. *Asian and Pacific Migration Journal, 23*(3), 273–297. https://doi.org/10.1177/011719681402300302

Ng, B.K., Chen, S.H., Wong, C.Y., & Chandran, VGR. (2019). University incubation system for research commercialisation: The case of Taiwan and Malaysia. *Science, Technology and Society, 24*(3), 465–485. https://doi.org/10.1177/0971721819873184

OECD. (2018). Programme for International Student Assessment (PISA): *Overviews summarising the results of PISA 2018 assessment*. https://www.oecd.org/pisa/publications/pisa2018results/

OECD. (2019). *Education at a glance, country note: Korea.* https://www.oecd.org/education/education-at-a-glance/EAG2019_CN_KOR.pdf

Ohno, K. (2013). *Learning to industrialize: From given growth to policy-aided value creation*. Routledge.

Paus, E. (2012). Confronting the middle-income trap: Insights from small latecomers. *Studies in Comparative International Development, 47*(2), 115–138. https://doi.org/10.1007/s12116-012-9110-y

Raj-Reichert, G. (2020). Global value chains, contract manufacturers, and the middle-income trap: The electronics industry in Malaysia. *Journal of Development Studies, 56*(4), 698-716. https://doi.org/10.1080/00220388.2019.1595601

Rasiah, R., Crinis, V., & Lee, H.-A. (2015). Industrialization and labour in Malaysia. *Journal of the Asia Pacific Economy, 20*(1), 77–99. https://doi.org/10.1080/13547860.2014.974327

Rasiah, R., Yap, X.-S., & Chandran Govindaraju, V.G.R. (2014). Crisis effects on the electronics industry in Southeast Asia. *Journal of Contemporary Asia, 44*(4), 645−663. https://doi.org/10.1080/00472336.2014.923637

Reinert, E. (2009). Emulation versus comparative advantage: Competing and complementary principles in the history of economic policy. In M. Cimoli, G. Dosi, & J.E. Stiglitz. (Eds.), *Industrial policy and development: The political economy of capabilities accumulation* (pp. 79–106). Oxford University Press.

Schneider, B.R. (2009). A comparative political economy of diversified business groups, or how states organize big business. *Review of International Political Economy, 16*(2), 178–201. https://doi.org/10.1080/09692290802453713

Malaysian Science and Technology Information Centre (MASTIC). (2016). *Malaysian science, technology and innovation (STI) indicators report 2016*. https://mastic.mosti.gov.my/sti-survey-content-spds/malaysian-science-technology-innovation-sti-indicators-report-2016

Wade, R. (1990). *Governing the market: Economic theory and the role of government in East Asian industrialization*. Princeton University Press.

Weber, K.M., & Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change: Combining insights from innovation systems and multi-level perspective in a comprehensive 'failures' framework. *Research Policy, 41*(6), 1037–1047. https://doi.org/10.1016/j.respol.2011.10.015

Wong, C.Y., Hu, M.C., & Shiu, J.W. (2015). Governing the economic transition: How Taiwan transformed its industrial system to attain virtuous cycle development. *Review of Policy Research, 32*(3), 365–387. https://doi.org/10.1111/ropr.12122

Wong, C.Y., Ng, B.K., Shazana, A., & Cheong, K.C. (2018). Talent and technological innovation in Malaysia, with lessons from China. In A. Tyson (Ed.), *The political economy of brain drain and talent capture: Evidence from Malaysia and Singapore* (pp. 106–121). Routledge.

Wong, C.Y., Sheu, J., & Lee, K. (2022). Dynamics or dilemma: Assessing the innovation systems of three satellite platform regions (Singapore, Dublin and Penang). *Eurasian Geography and Economics, 64*(5), 589–628. https://doi.org/10.1080/15387216.2022.2039741

Wong, C-Y. (2011). Rent-seeking, policies and national innovation systems in Southeast Asian economies. *Technology in Society, 33*(3–4), 231–243. https://doi.org/10.1016/j.techsoc.2011.09.003

Wong, C-Y. (2016). Evolutionary targeting for inclusive development. *Journal of Evolutionary Economics, 26*(2), 291–316. https://doi.org/10.1007/s00191-015-0441-5

Wong, C-Y., & Cheong, K.C. (2014). Diffusion of catching-up industrialization strategies: The dynamics of East Asia's policy learning process. *Journal of Comparative Asian Development, 13*(3), 369–404. https://doi.org/10.1080/15339114.2014.929939

Wong, C-Y., & Lim, G. (2020). A typology of agricultural production systems: Capability building trajectories of three Asian economies. *Asia Pacific Viewpoint, 61*(1), 37–53. https://doi.org/10.1111/apv.12220

Wong, C-Y., Chandran, VGR., & Ng, B-K. (2021). *FDI in Industry 4.0: The case of Malaysia*. Country paper prepared for *ASEAN Investment Report 2020–2021: Investing in Industry 4.0*.