

PELAN PERINDUSTRIAN PERAK

2030
PERAK
SEJAHTERA

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GLOSSARY

ADTEC - Advanced Technology Training Centre
AI - Artificial Intelligence
ASEAN - Association of South East Asian Nation
BEV - Battery Electric Vehicle
BRC - Business Research Company
CAGR - Compound Annual Growth Rate
CNC - Computer Numerical Control
COI - Centre of Investment, Perak
CREST - Collaborative Research in Engineering, Science and Technology
D&D - Design and Development
DDI - Domestic Direct Investment
DIHs - Digital Innovation Hubs
DGBSHs - Digital Global Business Services Hubs
DOSM - Department of Statistics Malaysia
E&E - Electricals and Electronic
EEV - Energy Efficient Vehicle
EHEHRC- Education, Higher Education, and Human Resource Committee
EMS - Electronic Manufacturing Services
ESG - Environmental, Social, and Governance
EV - Electric Vehicle
FDI - Foreign Direct Investment
FIZKinta - Kinta Free Industrial Zone
FMM - Federation of Malaysian Manufacturers
FSQD - Food Safety and Quality Division
GDP - Gross Domestic Product
HDC - Halal Development Corporation
HPA - High Purity Alumina
HQI - High-Quality Investment
HRD Corp - Human Resource Development Corporation
HSBB - High-Speed Broadband
IC - Integrated Circuit
ICE - Internal Combustion Engine
IDR - Institute Darul Ridzwan
IMEN - Institut Kejuruteraan Mikro dan Nanoelektronik, UKM
IMT-Golden Triangle - Indonesia, Malaysia, Thailand-Segitiga Emas
IoT - Internet of Things
IP - Invest Perak
IR4.0 - Fourth Industrial Revolution
IRB/IRBM - Internal Revenue Board (Malaysia)
JAKIM - Department of Islamic Development Malaysia
LED - Light-Emitting Diode
MaaS - Mobility as a Service
MARII - Malaysia Automotive Robotic and IoT Institute
MBI - Menteri Besar Incorporation

MCMC - Malaysian Communications and Multimedia Commission
MIDA - Malaysian Investment Development Authority
MIGHT - The Malaysian Industry-Government Group for High Technology
MIGHT Meteor - Might-Meteor Advanced Manufacturing Sdn. Bhd.
MIMOS - Malaysia's National Applied Research and Development Centre
MITI - Ministry of International Trade and Industry
MNCs - Multinational Corporations
MOE - Ministry of Education
MOH - Ministry of Health Malaysia
MRS - Manufacturing-Related Services
MSIA - Malaysian Semiconductor Industry Association
MSMEs - Micro, small and medium enterprises
NCER - North Corridor Economic Region
NCIA - The Northern Corridor Implementation Authority
NIA - National Investment Aspirations
NxGV - Next Generation Vehicle
OEC - Observatory of Economic Complexity
OECD - Organisation for Economic Co-operation and Development
OEM - Original Equipment Manufacturer
OIC - Organisation of Islamic Cooperation
PASAK - Pusat Aspirasi Anak Perak
PBT - Pihak Berkuasa Tempatan
PEJUTA - Persatuan Juruukur Tanah Bertauliah Malaysia
PESDC - Perak Entrepreneur & Skills Development Center
PHCSB - Perak Halal Corporation Sdn. Bhd.
PIDD - Perak International Development Dialogue
PKNP - Perak State Development Corporation
PKNPk - Perbadanan Kemajuan Negeri Perak
PLUS - Projek Lebuhraya Utara-Selatan
PPPU - Public-Private Partnership Unit (PPPU), Prime Minister's Office
PSDC - Penang Skills Development Centre
PV - Photovoltaic
R&D - Research and Development
SADC Perak - Perak State Agriculture Development Corporation
SEMI - SEMI Market Research Reports & Database Catalog
SERI, UKM - Solar Energy Research Institute, UKM
SHRDC Selangor Human Resource Development Centre
SME - Small Medium Enterprise
STEM Science, Technology, Engineering, and Mathematics
SVTP - Silver Valley Technology Park
TalentCorp - Talent Corporation
TVET - Technical and Vocational Education and Training
UNIDO - United Nations Industrial Development Organization
UPEN - Unit Perancangan Ekonomi Negara
UPSI - Universiti Pendidikan Sultan Idris
UTAR - Universiti Tunku Abdul Rahman

UTP - Universiti Teknologi Petronas

PART 1: ECONOMIC OUTLOOK

1.1 Global Perspectives

The recent COVID-19 pandemic has triggered a global health crisis, resulting in a significant economic downturn in 2020 due to weak demand and a disrupted supply chain amid widespread containment measures. This incidence could severely affect economic and social development in most, if not all countries. Large fiscal and monetary stimulus enacted by the government in most countries has mitigated the severity of the economic and social contraction. For the year 2022, we can see the light at the end of the tunnel as global economic recovery is already in motion. Countries have eased their movement restriction measures, and more economic sectors are open. Credit also needs to be given to the high vaccination rates that have helped significantly curb the outbreak.

Table 1.1: Global Real GDP Growth.

	2019	2020	2021 ^e	2022 ^f	2023 ^f
World	2.6	-3.4	5.5	4.1	3.2
Advanced Economies	1.7	-4.6	5.0	3.8	2.3
United States	2.3	-3.4	5.6	3.7	2.6
Euro area	1.6	-6.4	5.2	4.2	2.1
Japan	-0.2	-4.5	1.7	2.9	1.2
Emerging Market and Developing Economies	3.8	-1.7	6.3	4.6	4.4
Angola	-0.6	-5.4	0.4	3.1	2.8
Argentina	-2.0	-9.9	10.0	2.6	2.1
Bangladesh	8.2	3.5	5.0	6.4	6.9
Brazil	1.2	-3.9	4.9	1.4	2.7
China	6.0	2.2	8.0	5.1	5.3
Egypt	5.6	3.6	3.3	5.5	5.5
India	4.0	-7.3	8.3	8.7	6.8
Indonesia	5.0	-2.1	3.7	5.2	5.1
Iran	-6.8	3.4	3.1	2.4	2.2

Mexico	-0.2	-8.2	5.7	3.0	2.2
Nigeria	2.2	-1.8	2.4	2.5	2.8
Pakistan	2.1	-0.5	3.5	3.4	4.0
Poland	4.7	-2.5	5.1	4.7	3.4
Russia	2.0	-3.0	4.3	2.4	1.8
Saudi Arabia	0.3	-4.1	2.4	4.9	2.3
South Africa	0.1	-6.4	4.6	2.1	1.5
Thailand	2.3	-6.1	1.0	3.9	4.3
Turkey	0.9	1.8	9.5	2.0	3.0

Sources: World Bank (2022).

Notes: ^e denotes expected values, and ^f denotes forecast values.

Table 1 shows the global real GDP growth extracted from the Global Economic Prospects report by World Bank (June 2021). Overall, we can see that the COVID-19 pandemic outbreak in 2020 has caused a 3.4% contraction in the global economy. Advanced economies (-4.6%) are expected to be hit harder than emerging and developing economies (-1.7%). In 2021, there are signs of economic recovery from higher vaccination rates. The world economy is projected to rebound and substantially recover in 2021 and 2022, with growth projected to be 5.5% in 2021 and moderating growth at 4.1% in 2022.

The advanced economies are expected to have an average growth of 5.0% in 2021 and continue with moderate growth at 3.8% in 2022. In emerging markets and developing economies, the growth was projected at 6.3% in 2021 and 4.6% in 2022. But as the global economic recovery is uneven among the rich and poor countries, there is considerable uncertainty about its durability. This is because the ongoing pandemic continues to shape the path of global economic activity, with severe outbreaks continuing to weigh on growth in many countries.

From the international trade perspective, world trade volumes have expected to increase by 9.5% in 2021 and 5.8% in 2022. This optimistic projection has reflected an easing of containment measures amid the mass rollout of vaccines, the boost in private sector demand, improvement in cross-border trade in goods and services, and the continued accommodative policies in a few large economies. However, the future development of the world economy will depend on the path of the health crisis, including whether the new COVID-19 strains prove

susceptible to vaccines as they prolong the pandemic. In addition, the effectiveness of policy actions to limit persistent economic damage, the evolution of financial performances, and the adjustment capacity of the economy will shape future development.

The recent Russia-Ukraine war has further threatened to disrupt the global economic recovery due to expected supply shocks. Both countries are among the major global exporters of commodities such as wheat and corn, leading to higher economic commodity prices. The IMF cut its global growth projections for 2022 and 2023 as they expect the economic impact of Russia's invasion of Ukraine will propagate far and wide, adding to price pressures and exacerbating significant policy challenges. Meanwhile, the World Bank lowered its global growth forecast for 2022 from 4.1% to 3.2%, citing the pressure Russia's invasion of Ukraine has placed on the worldwide economy. In addition, the World Trade Organization (WTO) warned about the negative implications of Russia's war in Ukraine on global trade.

1.2 Regional Perspectives

The economic growth in East Asia and the Pacific region has bounced back from 2020, with varying recovery speeds among countries. The output level for the largest economy in the region, China, has surpassed its pre-pandemic level. This can be attributed to low infection rates and rapid recovery from public investment to consumption. Policymakers in China have diverted their focus from supporting economic activities to ensuring financial stability. Meanwhile, with lower output reduction from the pandemic outbreak, Indonesia shows gradual economic recovery. Rising tourism costs and fear of infections hinder tourism activities in tourism-dependent island economies, especially for the smaller economies.

Table 1.2 shows the real GDP growth for the East Asia and Pacific region. Overall, growth for 2021 in the region has expected to be around 7.1%, primarily contributed by China's economic rebound effect. According to the World Bank report, growth in China is expected to reach 8.0% in 2021, contributed by high domestic and international demand. Meanwhile, due to strict movement controls and rising uncertainties from new varieties, output in the rest of the region is predicted to expand by an average of 4.0 per cent in the same year. However, when countries transition to the endemic phase, the region's growth

(excluding China) is expected to reach 5.0 per cent in 2022. Vaccination rates in each country greatly impact how quickly and how long the economy recovers.

Table 1.2: Real GDP Growth for East Asia and Pacific Countries

Countries	2019	2020	2021 ^e	2022 ^f	2023 ^f
Cambodia	7.1	-3.1	2.2	4.5	5.5
China	6.0	2.2	8.0	5.1	5.3
Fiji	-0.4	-15.7	-4.1	7.8	6.9
Indonesia	5.0	-2.1	3.7	5.2	5.1
Kiribati	3.9	-1.9	3.0	2.6	2.4
Lao PDR	5.5	0.5	2.2	4.5	4.8
Malaysia	4.4	-5.6	3.3	5.8	4.5
Marshall Islands	6.6	-2.2	-2.5	3.5	2.5
Micronesia	1.2	-1.8	-3.2	1.0	3.0
Mongolia	5.5	-4.4	3.5	5.1	6.2
Myanmar	6.8	3.2	-18.0	0.0	0.0
Nauru	1.0	0.7	1.6	0.9	0.8
Palau	-1.8	-9.7	-16.0	12.0	14.0
Papua New Guinea	4.5	-3.5	1.0	4.0	3.0
Philippines	6.1	-9.6	5.3	5.9	5.7
Samoa	3.6	-2.7	-8.1	1.5	3.0
Solomon Islands	1.2	-4.3	2.0	4.5	4.4
Thailand	2.3	-6.1	1.0	3.9	4.3
Timor-Leste	1.8	-8.5	1.9	3.7	4.3
Tonga	0.7	0.7	-3.2	2.6	3.3
Tuvalu	13.9	1.0	2.5	3.5	3.8
Vanuatu	3.9	-6.8	1.2	3.0	4.1
Vietnam	7.0	2.9	2.6	5.5	6.5
East Asia and Pacific	5.8	1.2	7.1	5.1	5.2

Sources: World Bank (2021).

Notes: ^e denotes expected values and ^f denotes forecast values.

The ASEAN-5 (Malaysia, Philippines, Indonesia, Thailand, and Vietnam) are projected to grow at 3.2% in 2021 and 5.3% in 2022. Among these five countries, Vietnam is the only country that has output levels higher than its pre-pandemic levels. Meanwhile, the output levels for Philippines were reduced by 9.6% due longer period of strict lockdowns in 2020. The growth rate in Indonesia is expected to reach 3.7% in 2021 and further strengthen to 5.2% in 2022. Meanwhile, Thailand's growth rate in 2021 is expected to be the lowest (1.0%) among ASEAN-5, with growth picking up to 3.9% in 2022. Philippine growth is expected to reach 5.3% in 2021 and increase to 5.9% in 2022. Malaysia, on the other hand projected to reach 3.3% in 2021. Vietnam is projected to expand 2.6% in 2021 and continue to 5.5% in 2022.

1.3 Malaysia

Like most countries around the globe, Malaysia also faced difficult times in 2020. The COVID-19 pandemic has disrupted the domestic and international supply chain as most sectors are forced to close from the movement control order (MCO). The quick and drastic action taken by the government was fruitful as Malaysia was one of the earliest countries to curb the spread of the virus. However, the worst is yet to come at that time as the number of cases in Malaysia skyrocketed in the early and mid-2021. This led to another round of strict movement control imposed nationwide. This has clearly dampened the hope for a V-shaped recovery in 2021.

Table 1.3: Quarterly GDP Growth (%) By Economic Activity

Economic Activity	Q1/20	Q2/20	Q3/20	Q4/20	Q1/21	Q2/21	Q3/21	Q4/21
Agriculture	-8.6	0.9	-0.3	-1.0	0.2	-1.5	-1.9	2.8
Mining and Quarrying	-2.9	-20.8	-7.8	-10.4	-5.0	13.9	-3.6	-0.9
Manufacturing	1.4	-18.3	3.3	3.0	6.6	26.6	-0.8	9.1
Construction	-7.9	-44.5	-12.4	-13.9	-10.4	40.3	-20.6	-12.2
Services	3.1	-16.2	-4.0	-4.8	-2.3	13.5	-4.9	3.2
GDP at Purchasers' Prices	0.7	-17.2	-2.7	-3.4	-0.5	16.1	-4.5	3.6

Sources: Department of Statistics Malaysia (2022).

Table 1.3 shows the quarterly GDP growth in Malaysia by economic activity. In the third quarter of 2021, the Malaysian economy faced another round of demand and supply shocks from the strict containment measures under the National Recovery Plan (NRP). This caused the quarterly growth for Malaysia to contract by 4.5%. It is a drastic slump from 16.1% growth in the second quarter of 2021. The operations for most economic activities are distorted in Phase 1 of NRP but rebound in Phase 2 as more sectors are allowed to operate. The construction sectors are the most affected from the supply side perspective as they need to adhere to the operating capacity limits. The same can be said for the demand side, as the interstate travel restrictions have reduced the domestic demand in the economy. In comparison, public spending increases as the government provides financial incentives to support economic growth. On a quarter-on-quarter basis, the Malaysian economy registered a decline of 4.5% in the third quarter of 2021 (Bank Negara Malaysia, 2021).

The fourth quarter of 2021 shows positive signs as the Malaysian economy growth rebounded by 3.6%. This is contributed mainly by improvement in domestic demand as economic activity regained momentum with higher consumption and trade activity following the easing of containment measures. Moreover, positive economic growth in most countries has led to higher external demand. From the supply side perspective, all economic sectors showed improvements in growth, led by the services and manufacturing sectors. The manufacturing sectors recorded the highest jump in the economy by 9.1%, followed by services (3.2%) and agriculture (2.8%) sectors. However, the construction sectors and mining and quarrying still have negative growth rates, -12.2% and -0.9%, respectively.

Consumer-related activities continued to recover amid the reopening of the economy. This was reflected in the higher spending observed within the retail and recreational subsectors. The finance and insurance subsector also continued to grow, driven mainly by higher net insurance premiums. Growth in the information and communication subsector provided further support amid continued demand for data communications services, particularly for e-commerce and e-payment activities. The growth in the manufacturing sector was driven by continued strength in export-oriented industries such as E&E and primary related clusters and recovery in domestic-oriented industries.

Meanwhile, the positive growth in the agricultural sector was driven mainly by an expansion in oil palm output, as fresh fruit bunch yields improved, benefiting from the higher

rainfalls during the early part of the year. Growth was also supported by the expansion in livestock, other agriculture and forestry subsectors. The growth in the mining sector was contributed by higher production from oil and gas fields. The construction sector has reduced its contraction to 12.2%, compared to -20.6% in the third quarter of 2021. This was supported by higher construction activity, especially in the non-residential and special trade subsectors, following the reopening of the economy.

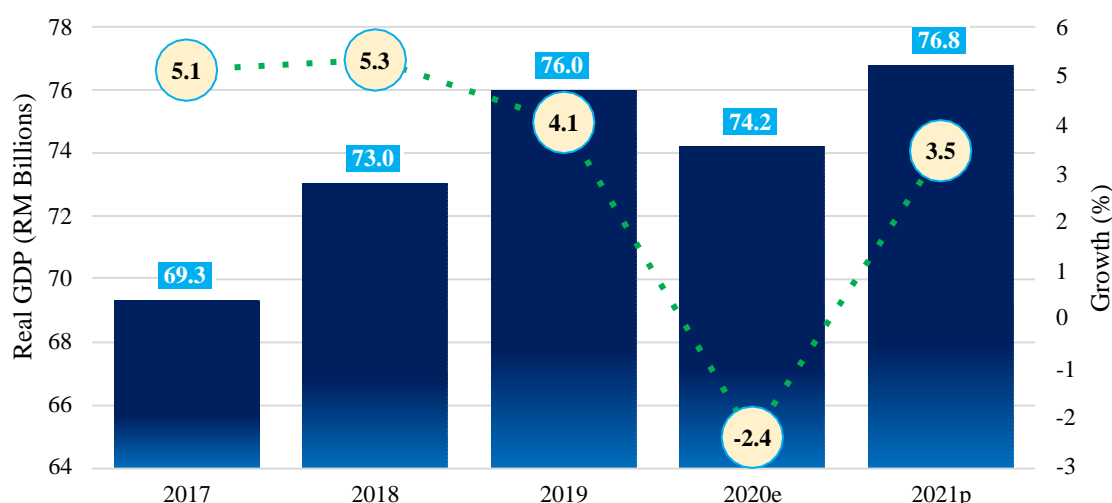
By 2021, the overall Malaysian economy growth at 3.1%. The gradual relaxations for reopening of more economic sectors, along with higher adaptability of firms to the new operating environment and continued policy support, partly mitigated the impact of nationwide containment measures in the third quarter. Furthermore, the successful rollout of the vaccination program, which has resulted in improved health outcomes, has enabled a phased and safe reopening of economic sectors and allowed the economy to continue its recovery path. For this year, the positive growth momentum has expected to improve. The economy would benefit from expansion in global demand, higher private sector expenditure in line with the resumption of economic activity, and continued policy support.

This causes the government to ramp up the vaccination rate and was proven successful as Malaysia has already reached 78.8% of its total population fully vaccinated as of 20th February 2022. The success of the National Covid-19 Immunisation Programme has allowed the full reopening of the economy and lowered the unemployment rate to 4.2% in December 2021, compared with the highest rate of 5.3% in May 2020 (Department of Statistics Malaysia, 2021). The federal government planned to transit to the endemic phase at the end of 2021, by achieving less than 1,200 cases daily and fewer than ten deaths daily for seven consecutive days. However, the plan has been put on hold as there is too much uncertainty regarding the recent spread of the COVID-19 Omicron variant. Recently, the number of daily cases in Malaysia has been alarming. As of 20th February 2022, the daily new COVID-19 cases in Malaysia have once again reached more than 28 thousand, with a total number of cases exceed 3 million cases.

1.4 Perak

This section is particularly interested in the overview of Perak's economic and social performances in 2020. The economy of Perak has been instrumental for Malaysia's development, being the 7th largest state by the size of its economy and accounting for 5.5% of the national GDP in 2020. As Perak is the centre of this study, understanding the economic and social outlook in Perak for 2020 can give an idea of what to look forward to for the strategic development plan. First, we look into the overall economic performances in Perak for the past few years. Figure 1.1 shows the real GDP (in RM billion) and its growth rate for Perak from 2017 to 2020. Perak has an increasing trend for real GDP from 2017 to 2019 and a drastic drop in 2020, just slightly above its 2018 level. Meanwhile, from the growth rate perspective, Perak had a lower growth rate in 2019 (4.1%) compared to 2018 (5.3%), further decreasing to -2.3% in 2020. This highlights the severity of the COVID-19 pandemic on Perak economic performance.

Figure 1.1: Real Gross Domestic Product for Perak.



Notes: e denotes expected, and p denotes predicted.

Sources: Department of Statistics Malaysia (2021).

It is also evident that the reduction in value-added is not the same across the sector. Hence, the real GDP is disaggregated into the main economic activity to view the sectoral performances, as shown in Table 1.4. We can see that only the agriculture and manufacturing sectors increment the real GDP for 2020. While all other economic activities have lower value-added values in 2020 than in 2019. We can also see that the value-added for mining, quarrying, and construction sectors for 2020 is less than its 2018 level. This shows that there

are varying impacts of the COVID-19 pandemic on the sectoral economic performances. We then report Figure 1.2 to complement Table 1.4 by providing a clear view of the sectoral growth rate for the year 2020.

Table 1.4: Real GDP in Perak by Economic Activity.

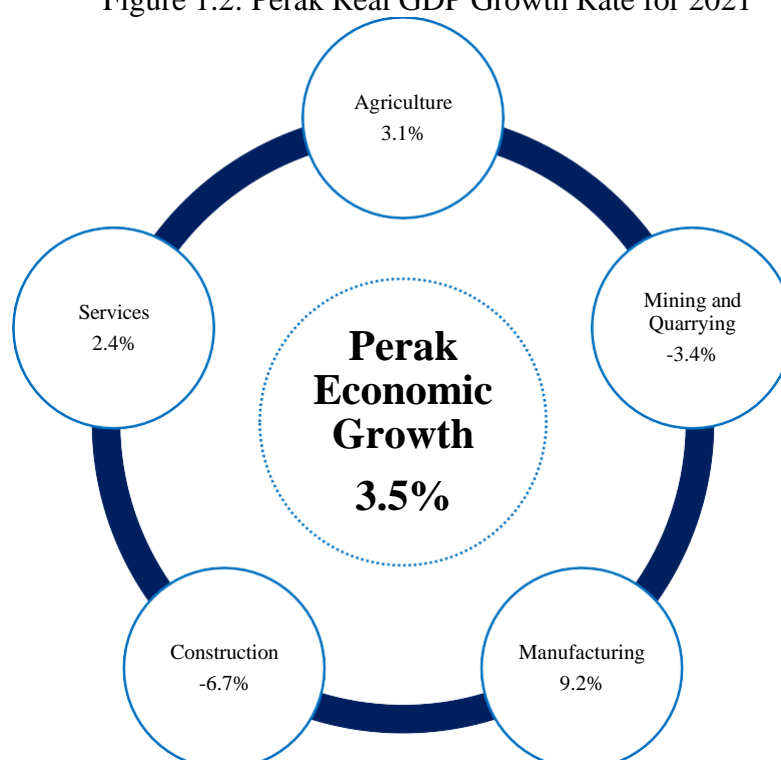
Kind of Economic Activity	2018	2019	2020 ^e	2021 ^p
Agriculture	10,993.83	11,312.41	11,429.19	11,784.23
Mining and Quarrying	460.60	504.55	432.14	417.26
Manufacturing	13,221.63	13,683.26	14,157.58	15,462.35
Construction	2,336.76	2,490.20	2,057.42	1,920.23
Services	45,910.80	47,970.59	46,071.47	47,161.29

Notes: ^e denotes expected and ^p denotes predicted.

Sources: Department of Statistics Malaysia (2021).

The agriculture and manufacturing sectors are the only sectors with a positive growth rate of 1.4% and 3.5%, respectively. Meanwhile, the construction sector has the highest negative growth, at -17.4%, followed by mining and quarrying at -9.3%. Although services sectors have the least negative growth, it is interesting to note that the services sector has a higher contribution to Perak state GDP, and this causes a significant reduction in the overall economy.

Figure 1.2: Perak Real GDP Growth Rate for 2021



Sources: Department of Statistics Malaysia (2021).

Despite the negative economic growth in Perak compared to the national level, Perak performed better and remained resilient in 2020. This is because the contraction in the state is far lower than the national level (-5.6%). Perak's agriculture and manufacturing sectors managed to record positive growth, whereas both sectors registered contraction at the national level. As the state economy shrank less than the national level, its contribution to Malaysia GDP increased slightly from 5.3% in 2019 to 5.5% in 2020. The Perak state economy is highly dependent on the services sector, which accounts for more than 60% of its GDP. In addition, the global trade war and pandemics did not disrupt the manufacturing sectors in Perak, as the share of the manufacturing industry in the Perak economy increased modestly to more than 18.0%. This can be due to diverse and broad kinds of industries in Perak.

Aside from the economic implications, the severity of the COVID-19 pandemic has also extended to the social developments in Perak as the unemployment rate in Perak has risen to 4.8% (53,000 labour force) in 2020 from 3.4% (36,700 labour force) in the previous year. The nationwide movement control hit the Perak job market more than other states due to the state's reliance on the services sector, which is more domestic-driven industry. Perak's labour force participation rates have also increased from 63.6% in 2019 to 64.3% in 2020.

Aside from the general labour force, it is also crucial to look into the graduates' labour force as they shape the nation's development in the future. From the graduates' statistics, we can conclude that the graduates' participation rates in the labour force for Perak have increased from 78.1% in 2019 to 79.7% in 2020.

Graduates unemployment rates in Perak also increased to 5.8% (15,500 graduates) in 2020, from 5.1% (12,800 graduates) in 2019. These percentages are still low and could not represent the actual situation as it has not considered underemployed graduates. To explore further, underemployment can be divided into time-related and skill-related underemployment. The former represents those that worked less than 30 hours a week, while the latter represents those with tertiary education but work in the semi-skilled and low-skilled category. The average graduate's wages in Perak have been reduced by 11%, from RM4,425 to RM3,955.

The negative implications of COVID-19 can be expected for 2022 as the number of daily cases has not ceased entirely with uncertainties from various new variants. This highlights the need for a thorough analysis of the economic and social performances from 2022 onwards.

PART II: SIMULATIONS & FORECAST FOR PERAK ECONOMIC DEVELOPMENT

2.1 Introduction

The pandemic problem has negatively impacted global and national economic performance, as most industries have been unable to maximise resources such as raw materials, labour, and capital. The agricultural and services industries received a tremendous blow, with most of the industry's activities minimised due to cautions of the spread of COVID-19. Activities in the services industry, such as tourism, hospitality and aviation, are the worst affected. Although we have entered the endemic phase, the domestic and global economic uncertainties and unstable political conditions are expected to affect the national and state economic development for the year 2022 as well. Hence, in the second chapter, this study is primarily interested in the simulation of Perak state economic and social development for 2022. This study is also interested in the forecast of Perak's economic performance till 2030.

2.2 Simulation for Perak Economic and Social Development for 2022

This study used input-output analysis based on the 2019 Malaysia Input-Output Table and the location quotient to simulate Perak's GDP in 2022. The Bank Negara Malaysia forecast the national GDP growth by 5.3% to 6.3% in 2022. We use this information as a guideline for the simulation scenario. Table 2.1 shows the actual GDP and employment for Perak in 2021 and simulated results for 2022. Overall, we can see that the GDP for Perak has expected to grow by 5.0%, while employment shall increase by 2.2% in 2022. This means we expect the positive growth in 2021 (3.5%) to continue in 2022. The employment changes are calculated by using elasticity for changes in GDP on employment at the national level. Our simulation results for the employment in Perak also show positive growth, which means that more labours are simulated to be employed in 2022 compared to the previous year. This is expected from positive economic growth.

Table 2.1: Overall Simulation Results

Indicators	2021	2022	Changes (%)
GDP (RM Millions)	76,780	80,600	5.0%
Employment	1,042,600	1,065,768	2.2%

Source: Authors' simulation

Table 2.2: Simulated Sectoral Growth

Major Sector	2022
Agriculture, Forestry and Fishing	1.0%
Mining and Quarrying	15.8%
Manufacturing	4.9%
Construction	0.4%
Services	6.1%
Total Economy	5.0%

Source: Authors' simulation

Table 2.2 shows the simulated value-added growth for the year 2022 by major economic sectors. From the table, the mining and quarrying, services and manufacturing sectors have the highest growth rate, equal to 15.8%, 6.1% and 4.9%, respectively. This is highly due to government policies to ensure the survivability of industries post-pandemic era. The construction sectors have the lowest growth (0.4%). Meanwhile, the agriculture, forestry and fishing sectors have a steady growth rate and thus are expected as these sectors are the least negatively affected in previous years.

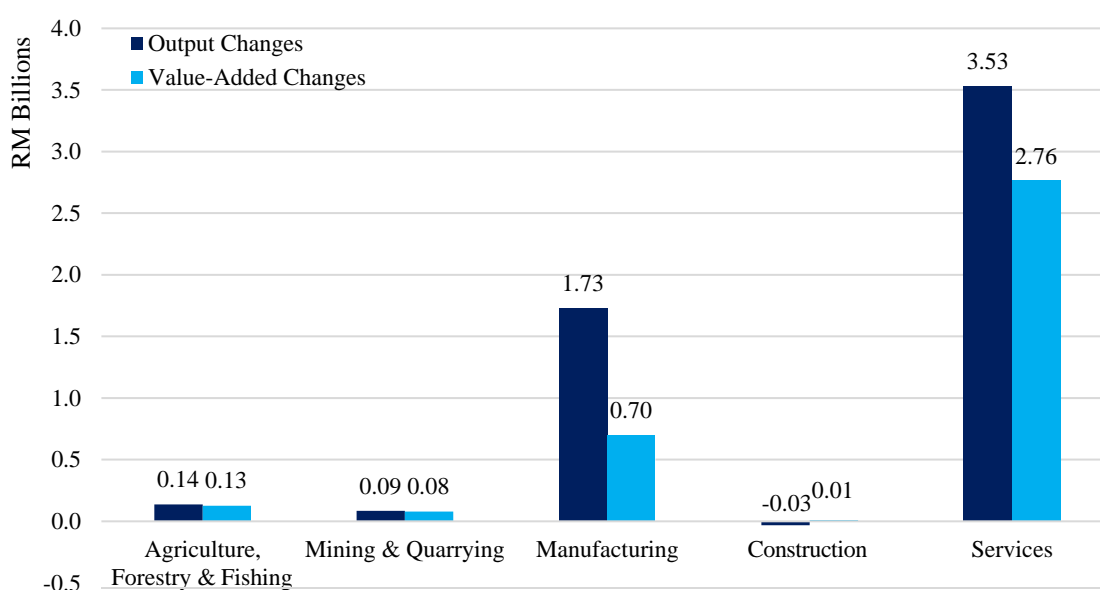
Table 2.3: Simulated Unemployment Rate

Indicators	2021	2022
Unemployed	58,000	50,732
Unemployment Rate	5.3%	4.5%

Source: Authors' simulation

The reduction in output will reduce input demand. In other words, lesser number of workers to be employed. Thus, this study calculates the social impact of the employment perspectives, as shown in Table 2.3. The unemployment rate for Perak in 2022 is expected to be around 4.5%, which is an improvement compared to the previous year (5.3%). This is equivalent to the reduction in the number of unemployed from 58,000 labour force in 2021 to 50,732 in 2022. However, it is essential to note that the implications on the labour market may not be immediate as the federal and Perak state government has taken several fiscal measures (such as the wage subsidy policy) that have helped improve their financial capacity and led to lesser changes in the workforce. Thus, the simulated unemployment rate for 2022 may serve as the potential rate if there are no government intervention policies.

Figure 2.1: Output and Value-Added Changes by Major Sector in 2022.

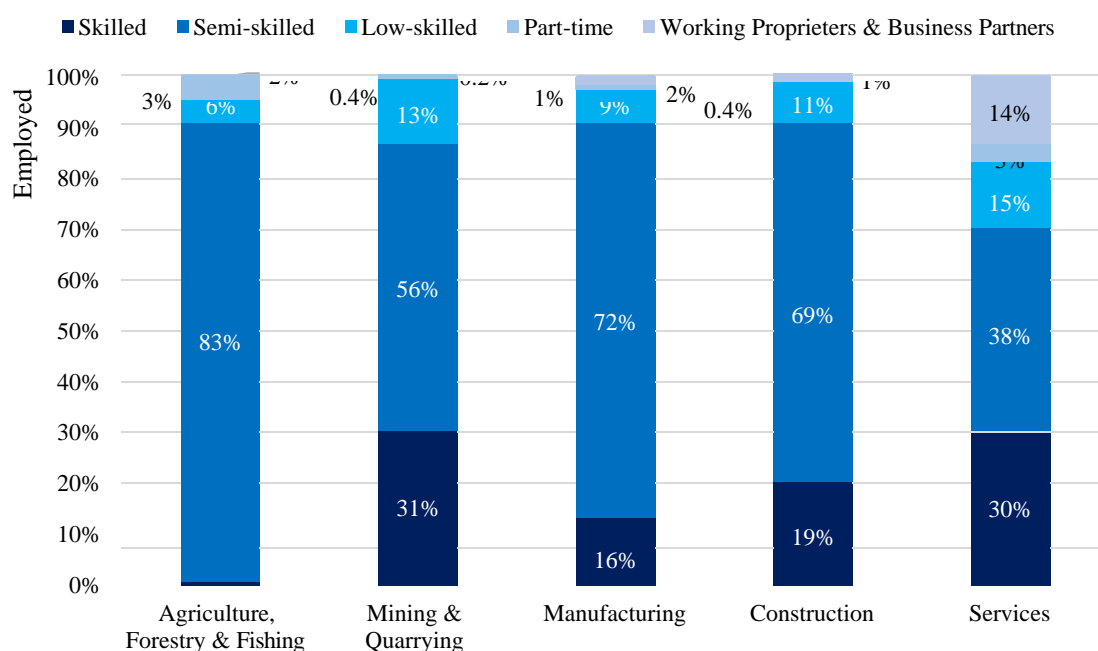


Source: Authors' simulation

The simulation outcome for the output and value-added changes are aggregated by major sectors to understand the accumulated sectoral impact, as shown in Figure 2.1. All major sectors have positive changes compared to their 2021 values, except construction sectors. Services sectors show the highest gains in output (RM3.53 billion) and value-added (RM2.76 billion), followed by the manufacturing sector. Post lockdown, the rebound effect contributes to this as industries increase their production to meet the previous lack of supply

in the economy. The agriculture, forestry and fishing output has increased by RM0.14 billion. The output and value-added changes for the remaining sectors are a lower contribution to Perak state GDP compared to all other sectors.

Figure 2.2: Sectoral Employment Composition by Skills Level in 2022

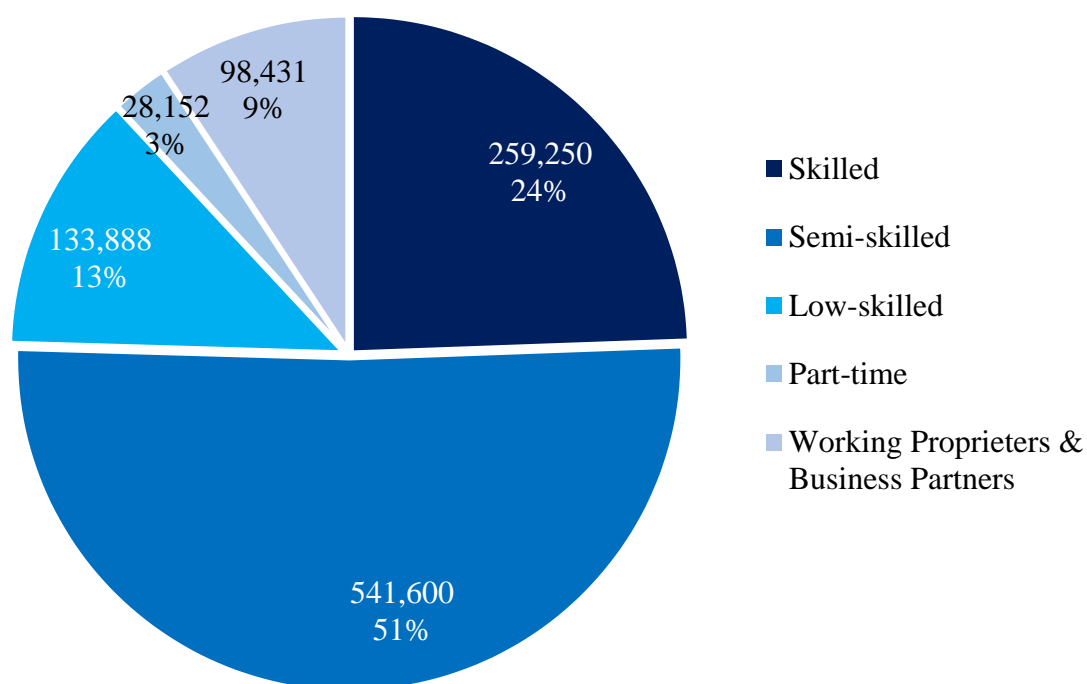


Source: Authors simulation

The employment composition by skills level can help the state government focus their policies on the selected sectors. The study further disaggregates the simulated employment in Perak by skills level composition, as shown in Figure 2.2. The proportion of skilled workers in the mining, quarrying, and services sectors is the highest (31% and 30%, respectively), while the shares of skilled workers in the agriculture, forestry, and fishing sectors are the lowest (7%). Interestingly, 83% of employed labour in the agriculture, forestry and fishing sectors are semi-skilled workers, which is expected from primary industries. The manufacturing and construction sectors also have high shares of semi-skilled employees, 72% and 69%, respectively. Figure 2.2 also shows that only the services sectors have relatively high shares of working proprietors and business partners (14%).

Figure 2.3 shows Perak's simulated number of employed workers by skills level in 2022. As can be seen, a large chunk (51%) of employed workers in Perak are categorised as semi-skilled workers. The skilled and low-skilled workers represent 24% and 13%, respectively. The remaining employed are classified into working proprietors, business partners (9%), and part-timers (3%). The information obtained from this pie-chart can be used to conclude that any economic changes will primarily affect semi-skilled, skilled and low-skilled workers in Perak.

Figure 2.3: Employed by Skills Level in 2022.



Source: Authors simulation

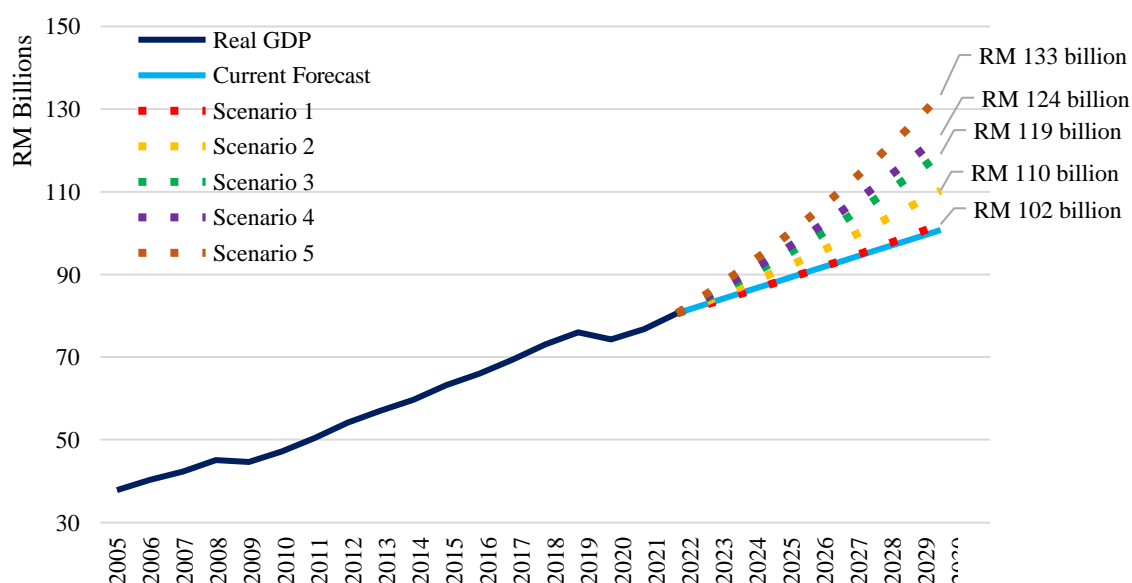
2.3 Forecast for Perak Economic Performance

This study conducts several forecasting analyses to forecast the economic performances for Perak up to 2030. This study utilises Autoregressive Integrated Moving Average (ARIMA) methodology to achieve this objective. The values for Perak GDP from 2005 to 2021 are obtained from the Department of Statistics Malaysia. Meanwhile, the value for Perak GDP in 2022 is from the earlier input-output analysis. The forecast results are also shown in Figure 2.4, together with growth projection from five scenarios:

- i. Scenario 1 (worse case): 3% Perak annual economic growth
- ii. Scenario 2 (medium case): 4% Perak annual economic growth
- iii. Scenario 3 (realistic case): 5% Perak annual economic growth
- iv. Scenario 4 (IDR case): 5.5% Perak annual economic growth
- v. Scenario 5 (best case): 6.5% Perak annual economic growth

Overall, Perak GDP has shown an increasing trend, except a slight drop in 2009 due to the global subprime crisis and 2020 due to the COVID-19 pandemic. After 2021, our forecast shows that the Perak state GDP is expected to be back on its previous increasing trend and expected to reach RM100 billion in 2030. Based on the best case scenario, if the economy grow at 6.5% annually, Perak can reach RM100 billion in 2026. However, if the economy growth at 5% or 4% annually, Perak can achieve RM100 billion in 2027 or 2028, respectively. This shows that with higher and consistent economic growth, Perak's GDP can achieve RM100 billion faster. It is important to note that this is for real GDP, where the values have considered the changes in the price level.

Figure 2.4: Real GDP Forecast for Perak from 2023 till 2030

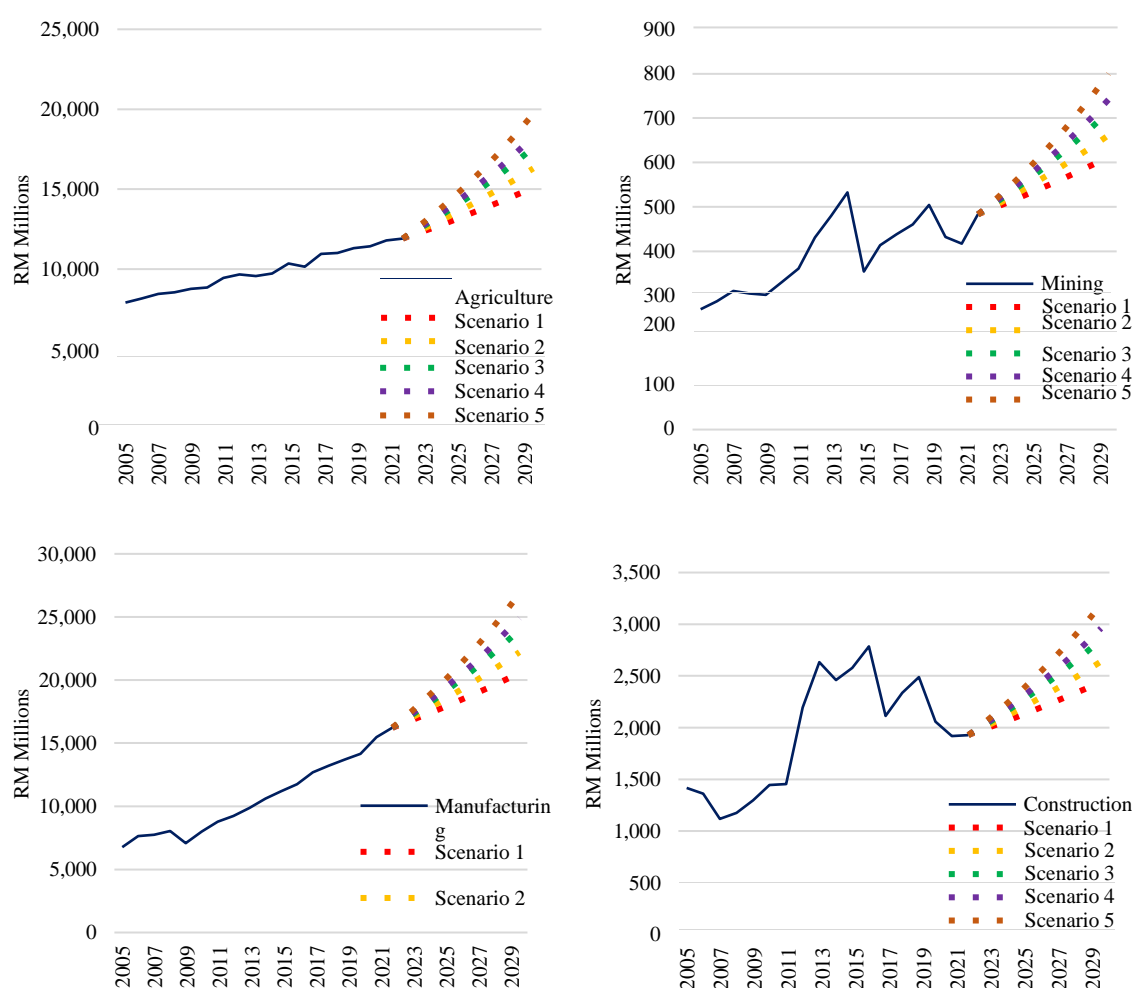


Source: Authors

To further analyse the contribution of each major economic activity, this study forecasts the real GDP for Perak by economic in Figure 2.5. Similar to the GDP forecast, the

five scenarios are also used here. Overall, from 2005 till 2022, we can see that most of the economic activity in Perak has an upward trend, except for the mining and quarrying and construction sectors. The services sectors contributed the most to the state GDP, where in 2030, services sectors are forecasted to contribute RM72.9 billion to the state economy, based on scenario 3. Moreover, manufacturing and agriculture are forecasted to reach RM24.1 billion and RM18.0 billion, respectively, in 2030. The rising values of manufacturing sectors also highlight their potential to drive the state's economic performance in the future. In terms of the sectoral contributions to the state GDP, all five scenarios will provide the same percentage as per in 2022 (agriculture=15.2%, mining=0.6%, manufacturing=20.3%, construction=2.5%, services=61.4%). This is because, the same growth scenarios are assumed for all sectors, hence the ratio of its contribution will remain constant.

Figure 2.5: Perak Real GDP by Kind of Economic Activity Forecast from 2023 till 2030



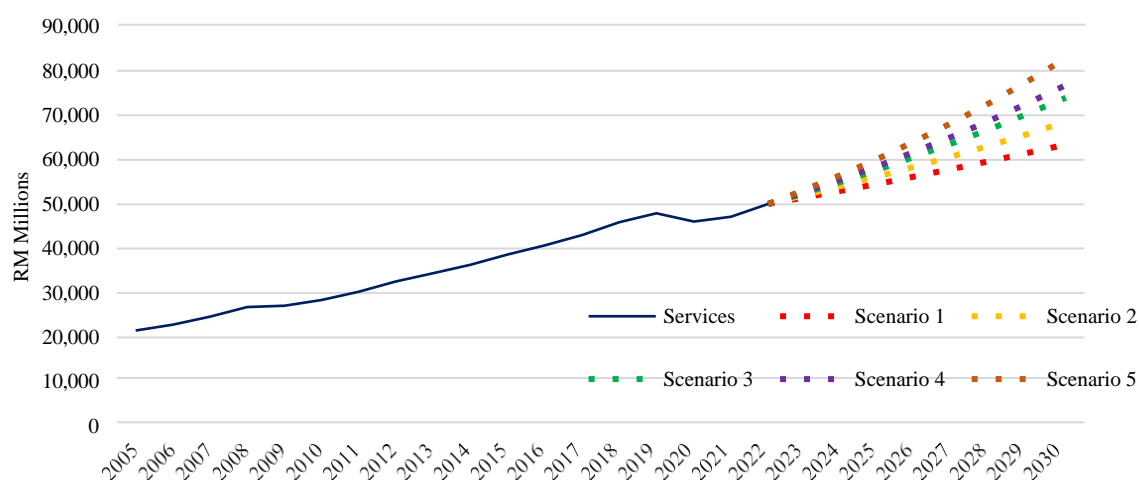
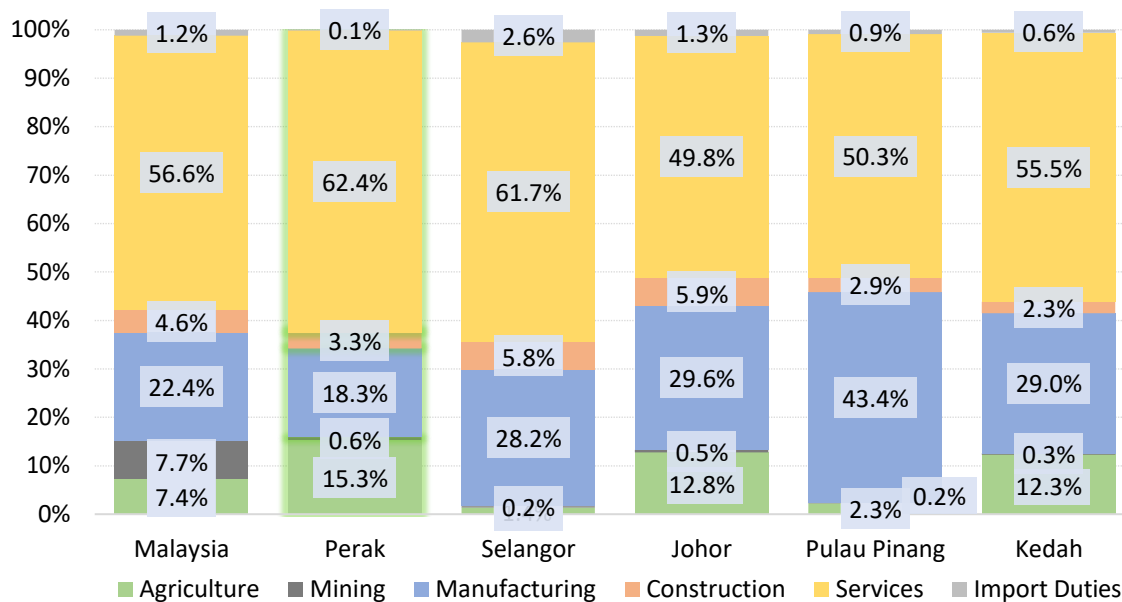


Figure 2.6: Average Sectoral Contribution to GDP from 2016 to 2020



Source: Authors

Figure 2.6 shows the average sectoral contribution to GDP. We compared the Perak sectoral contribution with the national level at states with similar economic development (Selangor, Johor, Pulau Pinang and Kedah). Currently, the average manufacturing sector contribution to GDP in Perak is the lowest (18.3%) compared to the other focus state. It is also far lower than the national level (22.4%). This clearly shows that the current trend is far lower

than the target for 2020, where manufacturing sectors contribute 25% to the state economy. Next, we look into the sub-sector's contribution to the Perak GDP for the services and manufacturing sectors.

Table 2.4: Services Sub-Sectors GDP Shares

GDP Contribution by Kind of Economic Activity	2015	2020	2025	2030
Services	61.1%	62.1%	62.7%	63.1%
Utilities, transportation & storage, information & communication	19.6%	19.6%	20.0%	19.9%
Wholesale & retail trade, food & beverage & accommodation	16.8%	17.6%	18.2%	18.6%
Government services	11.2%	11.8%	12.3%	13.0%
Finance & insurance, real estate & business services	8.0%	7.6%	7.3%	7.1%
Other services	5.6%	5.4%	4.9%	4.5%

Notes: Values for 2025 and 2030 are forecast values.

Table 2.4 shows the services sub-sectors GDP shares from 2015 to 2030. The values for 2015 and 2020 are actual values; meanwhile, the values for 2025 and 2030 are forecast values. We can see an increasing trend in total services sector contribution to the state economy. From the sub-sectoral perspectives, the utilities, transportation and storage, and information and communication sub-sector have the largest contribution, almost 20% GDP shares in 2030. This is followed by wholesale and retail trade, food and beverages, and accommodation sub-sector by 18.6% in 2030. On the other hand, the finance and insurance, real estate, and business services sub-sector are projected to decrease from 8.0% in 2015 to 7.1% in 2030.

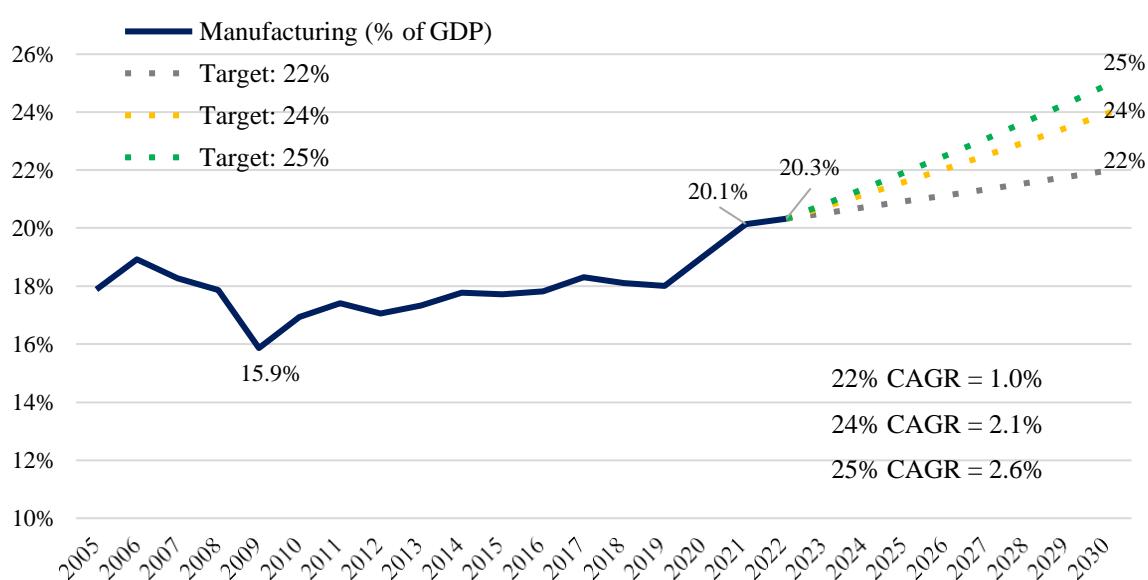
Table 2.5: Manufacturing Sub-Sectors GDP Shares

GDP Contribution by Kind of Economic Activity	2015	2020	2025	2030
Manufacturing	17.7%	19.1%	20.8%	22.5%
Electrical, electronic & optical products	5.5%	6.4%	7.4%	8.4%
Petroleum, chemical, rubber & plastic products	3.1%	4.4%	5.7%	7.1%

Vegetable & animal oils & fats, food processing, beverages & tobacco products	3.1%	3.2%	3.2%	3.3%
Non-metallic mineral products, basic metal & fabricated metal products	3.4%	3.0%	2.9%	2.6%
Transport equipment, other manufacturing & repair	2.6%	2.1%	1.6%	1.1%

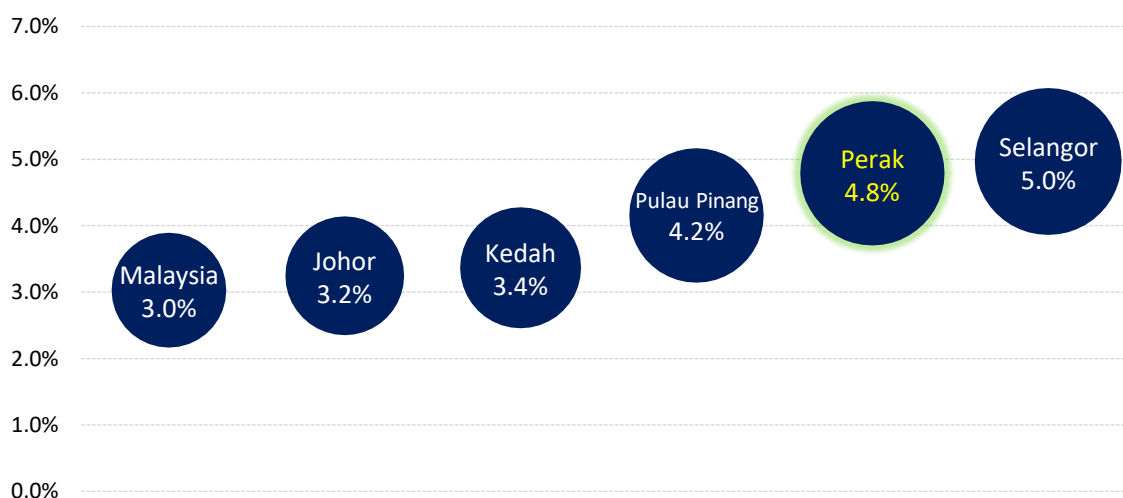
The manufacturing sub-sectors' contributions to Perak GDP are shown in Table 9. Overall, we can see that the electrical, electronic and optical products sub-sector are the largest manufacturing sector's contribution to Perak GDP and are projected to have an increasing trend from 5.5% in 2015 to 8.4% in 2030. This is followed by the petroleum, chemical, rubber and plastic products sub-sector. Meanwhile, the non-metallic mineral products, basic metal and fabricated metal products sub-sector and also the transport equipment, other manufacturing and repair sub-sector are projected to have a lower contribution to the state GDP in 2030. Although the overall manufacturing sectors have an increasing trend, this is still lower than the 25% target. Hence this study calculates the growth rate needed for the manufacturing contribution to Perak GDP, and the results is shown in Figure 2.7.

Figure 2.7: Projection of Manufacturing Contribution to Perak Real GDP



Source: Autho

Figure 2.8: Manufacturing Sectoral Growth to Real GDP



Source: Authors

From 2018 to 2022, the Perak manufacturing sector's contribution to GDP is growing by 2.2%. However, to achieve 25% by 2030, the manufacturing sectoral contribution needs to grow by 2.6% per annum. In contrast, if the state policymakers decide to reduce the target to 24% or 22%, the manufacturing sectoral contribution needs to grow by 2.1% or 1.0% per annum, respectively. This means that, without any further policy intervention, it is impossible to reach 25% manufacturing sectoral contribution in 2030. From the value-added perspective, the manufacturing sectors need to grow by 8.4% annually to achieve 25% of GDP. In addition, to evaluate the current growth rate, we calculate the average manufacturing sectoral growth for Malaysia and the selected state from 2016 to 2020. The results are shown in Figure 2.8, where we can see that Perak have the second-highest growth (4.8%) compared to the other state, just behind Selangor (5.0%). This shows that previous efforts taken by policymakers have benefitted in increasing the growth rate for manufacturing sectors in Perak.

Figure 2.9: Realized Investment & Manufacturing Value-Added

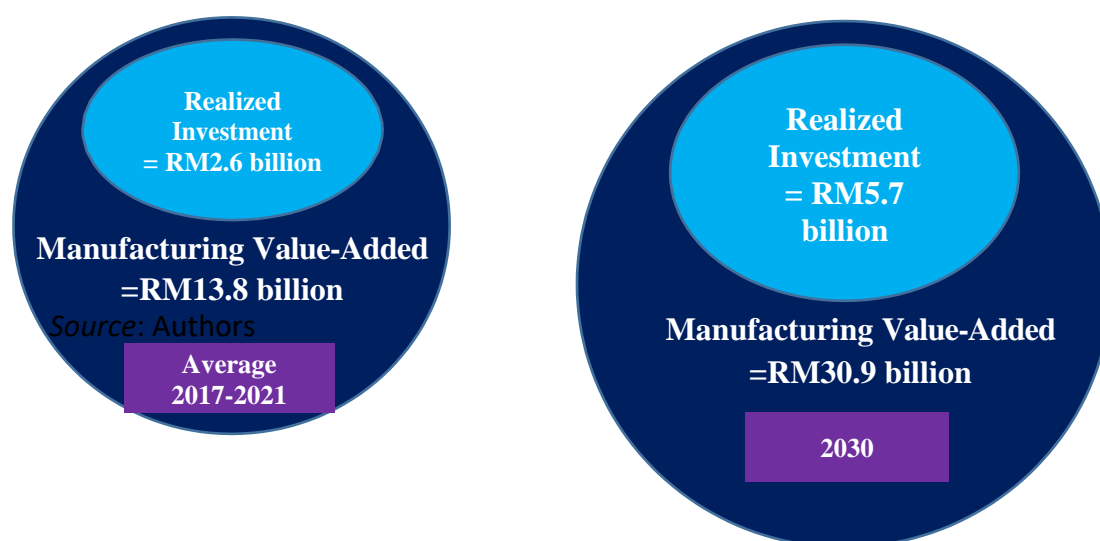
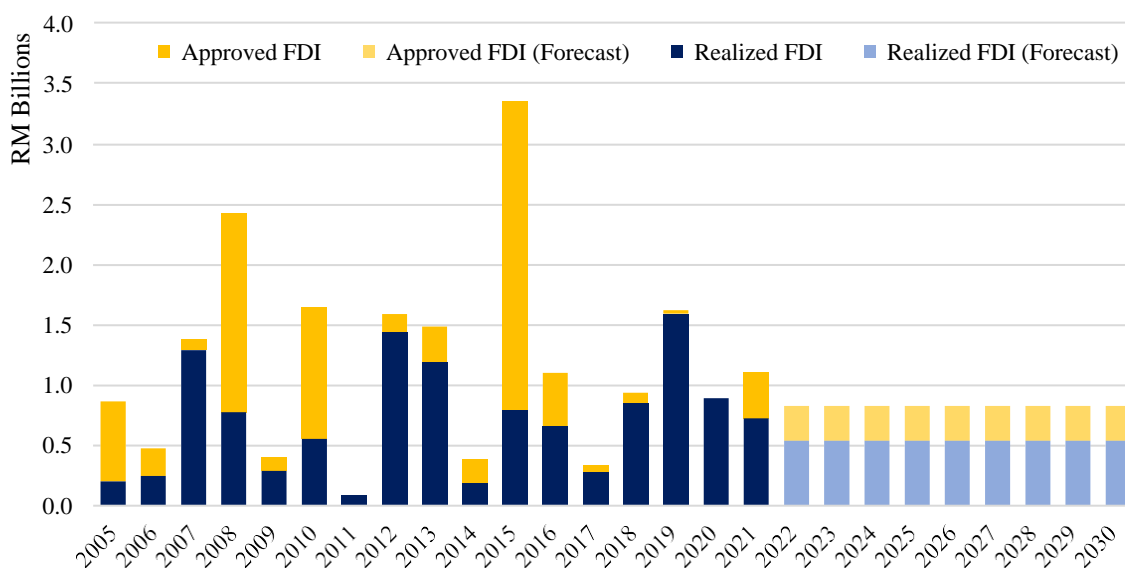


Figure 2.9 shows the average value-added from the manufacturing industry from 2017 to 2021 and the projected manufacturing value-added in 2030, where we can see that the projected value-added in 2030 has multiplied more than double. More investment needs to be realised to achieve a 25% share of the manufacturing sector's contribution to the state GDP. Our calculation shows that the policymakers need to ensure that the realised investment increases by an average of 8.4% annually to achieve RM5.7 billion in 2030. This is crucial as investment drives the performances of manufacturing sectors. More investments can help boost the performance and output of manufacturing industries in Perak. In addition, this can also lead to higher employment in Perak.

Foreign investments are crucial in ensuring each state in Malaysia can achieve a sustainable economic growth rate in the future. Thus, efforts have been taken by the policymakers in Perak to attract more foreign direct investment (FDI) to the state. FDI is beneficial in terms of income, but it also helps finance the construction of new infrastructure and create more jobs, especially for the local community. Figure 2.10 shows the actual and forecasted trend for approved and realised FDI in Perak. From 2005 till 2021, there is a fluctuating trend for the approved and realised FDI in Perak, with a distinct jump in approved FDI by RM3.4 billion in 2015. However, shares of FDI realised from the approved FDI are still low. The model forecast that the approved FDI from 2021 till 2030 will be around RM830

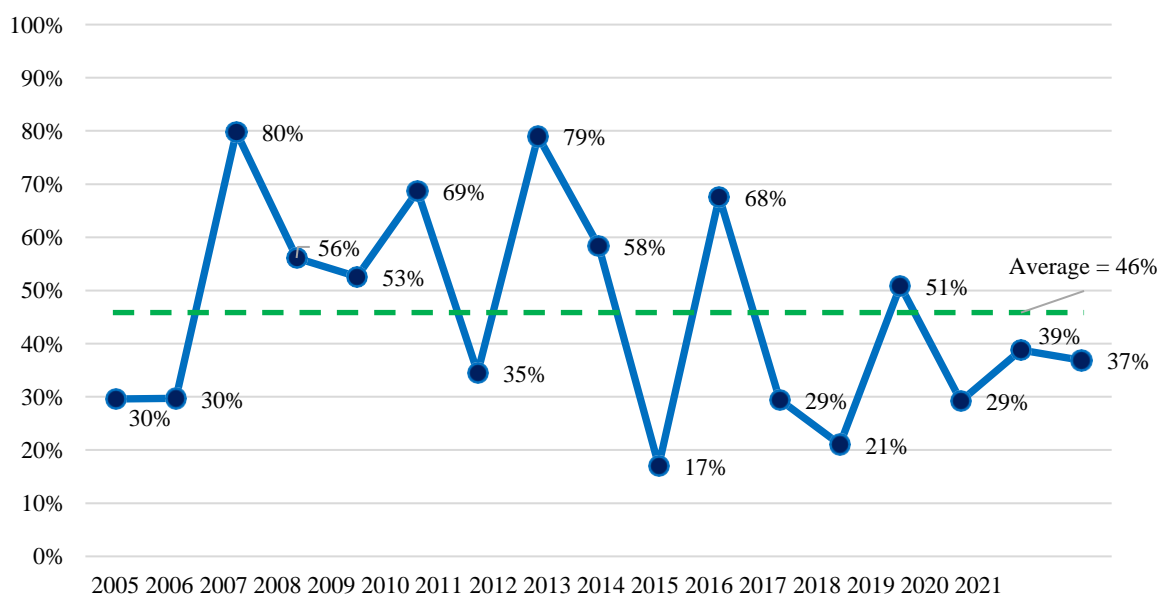
million, while the realised FDI will be around RM540 million. In 2030, approximately 63% of approved FDI is expected to be realised, based on the average shares from 2005 till 2020.

Figure 2.10: Approved FDI & Realized FDI for Perak



Source: Authors

Figure 2.11: FDI to Total Investment Ratio.



Source: Authors

Although it is almost half the total approved FDI, more actions must be taken to ensure that the state's economy gains the full potential benefit from the approved investments. Aside from the foreign investment, this study also interested in the overall investment in Perak. Figure 2.11 shows the ratio of FDI to total investment in Perak from 2005 till 2021. On average, 46% of the total investment in Perak are FDI. This further highlights the importance of foreign investment in driving the state economy. In addition, the fluctuating trend is driven by the inconsistency of foreign investment inflow. In 2021, 37% of total investment in Perak was FDI. More FDI needs to be realised so that FDI can contribute significantly to the state economy.

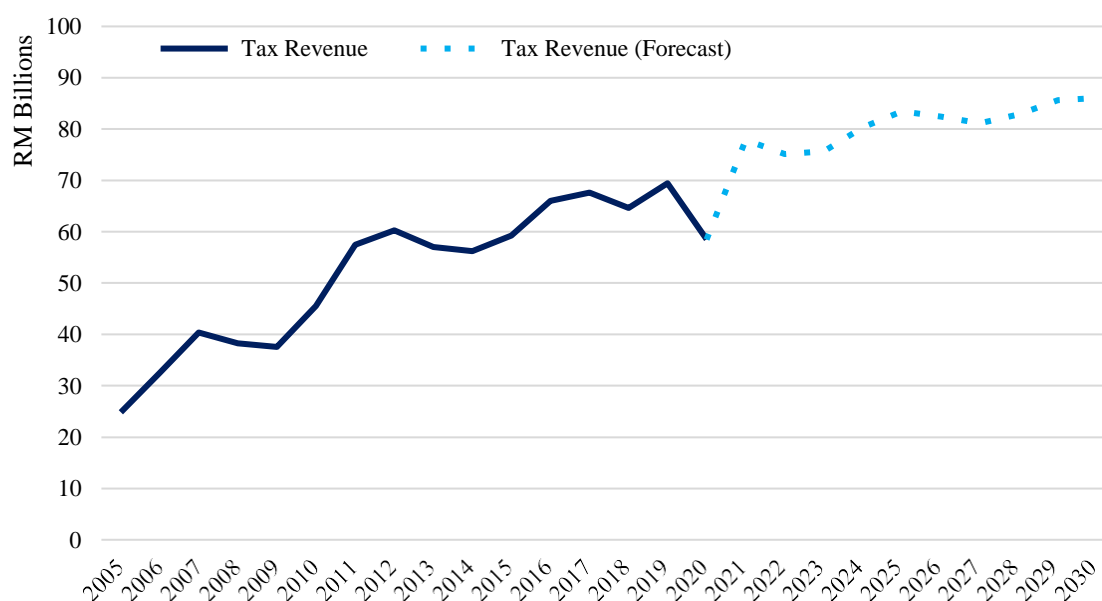
Table 2.6: Projected Approved and Realised Investment (RM Billions)

Year	Realised Investment	Approved Investment
2022	2.79	3.74
2023	3.05	3.96
2024	3.33	4.20
2025	3.64	4.45
2026	3.99	4.72
2027	4.36	5.00
2028	4.76	5.30
2029	5.21	5.62
2030	5.70	5.96

Source: Authors

To provide a clear guideline for policymakers on the amount of investment needed from 2022 till 2030 to achieve 25% manufacturing shares to GDP, this study project the realised investment as seen in Table 2.6. The average realized investment are calculated to be 82%. As shown in Figure 2.9, RM5.7 billion of realised investments are needed in 2030 to achieve the target. Hence, policymakers must ensure the approved investment reaches RM8.84 billion in 2030. This also highlights the need for affirmative policies to be taken, especially in attracting local and foreign investment into Perak.

Figure 2.12: Manufacturing Tax Revenue for Perak



Source: Authors

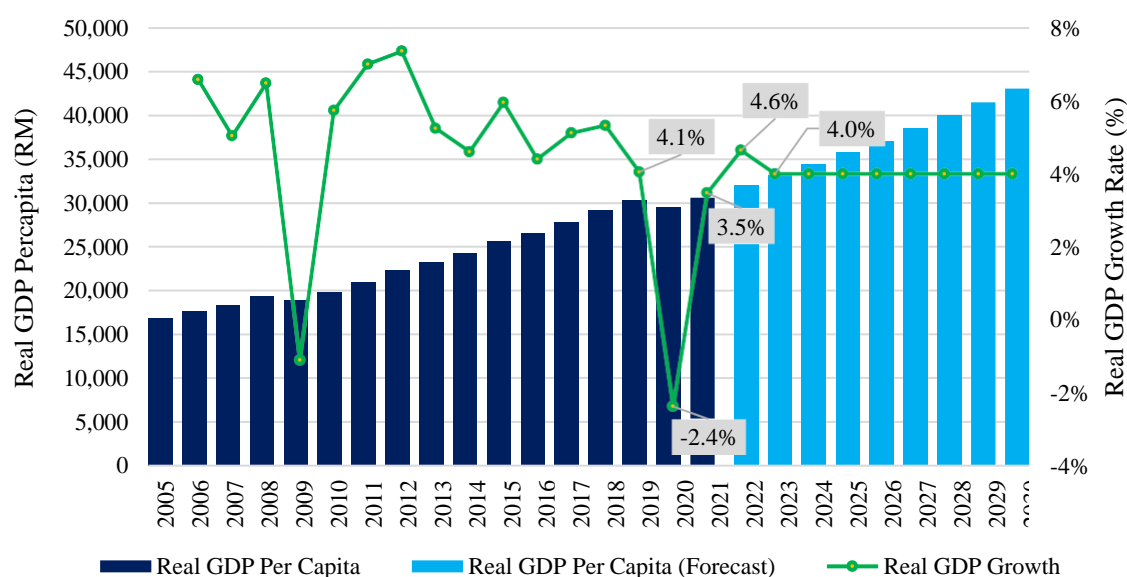
The tax revenues for Perak are shown in Figure 2.12. The data from 2005 to 2020 are obtained from the state government; meanwhile, the data from 2021 to 2030 are forecasted using ARIMA. In brief, we can see an increasing trend throughout the sample years. There is a significant drop in tax revenues in 2020, which is clearly due to the COVID-19 pandemic. Perak tax revenue has expected to reach around RM86 billion in 2030. This projection is possible if the economic recovery has not been disrupted by any upcoming uncertainties and the risk of new deadly variants emergence. Any future economic disruption will distort the incomes and taxes collection.

Figure 2.13 shows Perak's real GDP per capita and economic growth from 2005 to 2030. Overall, we can conclude that there are consistent increasing trends in Perak's real GDP per capita except for 2009 and 2020. The former is due to the global financial crisis arising from the sub-prime crisis, while the latter is due to the recent pandemic. However, the forecast trend is increasing with decreasing growth rate. By 2030, real GDP per capita will be expected to reach RM38,595. This highlights the need for government policy changes or economic structural reform to ensure a sustainable growth rate in Perak.

The real GDP per capita data from 2005 till 2020 are obtained by dividing real GDP by the population in Perak, where both data were obtained from the Department of Statistics

Malaysia. Meanwhile, data for 2021 are taken from the simulated real GDP in the input-output analysis, while the data from 2022 to 2030 are from ARIMA forecasting conducted earlier. The population data from 2021 to 2030 were calculated using the national population projection. Recent data shows the real GDP for Perak will grow by 3.5% in 2021, which is higher than the national level (3.1%). According to our earlier simulations, economic growth has expected to rise at a rate of 4.6% per cent in 2022 and maintained at 4.0 per cent in 2023 onwards. However, the growth rate maintained at 4.0% is because we use the forecasted GDP values from the medium case scenario

Figure 2.13: Real GDP Per Capita and Economic Growth for Perak



Source: Authors

Table 2.7: Real GDP and GDP Per Capita in 2021.

States	Real GDP	Real GDP Shares (%)	Real GDP Rank	GDP Per Capita	GDP Per Capita Rank
Johor	131,056	9.5%	4	32,601	9
Kedah	47,471	3.4%	10	22,062	13
Kelantan	25,774	1.9%	13	14,222	15

Melaka	41,814	3.0%	11	41,627	6
Negeri Sembilan	47,696	3.4%	9	39,608	7
Pahang	55,354	4.0%	8	34,564	8
Pulau Pinang	98,964	7.1%	5	56,876	3
Perak	76,780	5.5%	7	30,519	10
Perlis	5,866	0.4%	15	20,396	14
Selangor	343,501	24.8%	1	48,969	5
Terengganu	35,152	2.5%	12	30,027	11
Sabah	78,670	5.7%	6	23,053	12
Sarawak	131,175	9.5%	3	53,202	4
W.P. Kuala Lumpur	218,233	15.7%	2	111,117	1
W.P. Labuan	7,629	0.6%	14	79,471	2
Malaysia	1,386,738			42,569	

Source: Department of Statistics Malaysia (2022).

Table 2.7 shows the real GDP and GDP per capita for all states in Malaysia. Overall in 2021, Perak contributed 5.6% to the national GDP and rank 7th in comparison with other states. However, from the GDP per capita perspectives, Perak rank 10th, only better compared to Terengganu, Sabah, Perlis, Kedah and Kelantan. This shows that much needed to be done in order to achieve the top 5 states with the highest GDP per capita by 2030. Currently, Kuala Lumpur is in the first place, followed by Labuan, Pulau Pinang, Sarawak and Selangor.

Our calculation shows that to reach top 5 states with the highest GDP contribution, Perak GDP contribution should reach 7% in 2030 and its only possible if Perak GDP grow annually by 7.1% or its GDP per capita need to grow annually by 6.2%. This will help Perak to achieve 6th rank in GDP per capita. This shows that the growth are still not sufficient to ensures Perak reach the top 5 highest GDP per capita in 2030. By assuming the average GDP per capita growth rates for all other states (2015 till 2019), we estimate that Perak GDP per capita need to grow by 8.5% annually to reach around RM63,800 by 2030. This will help Perak to reach 5th places, slightly better than Sarawak.

2.4 Importance of FDI on Perak Economic Development.

Most past empirical studies on the FDI-growth relationship used the neoclassical economic growth and endogenous growth models as the base model. Fundamentally, these models are developed from the standard Solow growth model, which suggests that GDP is a function of the nation's stocks of capital and labour and other factors that may affect these inputs' productivity, such as financial development. This study evaluates how realised FDI affects Perak's economic growth using econometric estimations. In addition, this study further disaggregates the investment into foreign investment (FDI) and domestic investment (DINV). Thus, we obtain the following model:

$$\ln RGDP_t = \beta_0 + \beta_1 FDI_t + \beta_2 DINV_t + \beta_3 \ln EMP_t + \beta_4 \ln POP_t + \varepsilon_t$$

Where $\ln RGDP_t$ are a natural log of real GDP, FDI_t are realised FDI, $DINV_t$ are realised domestic investment, $\ln EMP_t$ are the natural log of employment, $\ln POP_t$ are natural log of population, and ε_t are the error term. This study used time series data for Perak from 1999 to 2020, with slight interpolation for the missing data. Table 2.8 below reports the ordinary least squares (OLS) regression results.

Table 2.8: Regression Results.

Variables	Coefficients
FDI_t	0.0146
$DINV_t$	0.0316***
$\ln EMP_t$	1.2697***
$\ln POP_t$	2.2761***
Constant	-1.7176
R ²	0.9860

Notes: *** denotes significant at 1%.

The regression shows that when the realised FDI in Perak increases by RM1 billion, Perak's GDP will increase by 1.5%. Meanwhile, the impact of a RM1 billion increase in domestic investment on Perak GDP is larger (3.2%). This can be noted due to larger domestic investment proportions than foreign investment. On average, from 2005 till 2019, realised FDI in Perak represented 46% of total realised investment in Perak. For the other two control

variables, an increment in employment and population in Perak by 1% will lead Perak's GDP to increase by 1.3% and 2.3%, respectively. Moreover, all variables are significant, except for FDI; hence more data are needed to support the positive impacts of FDI on Perak's economic growth.

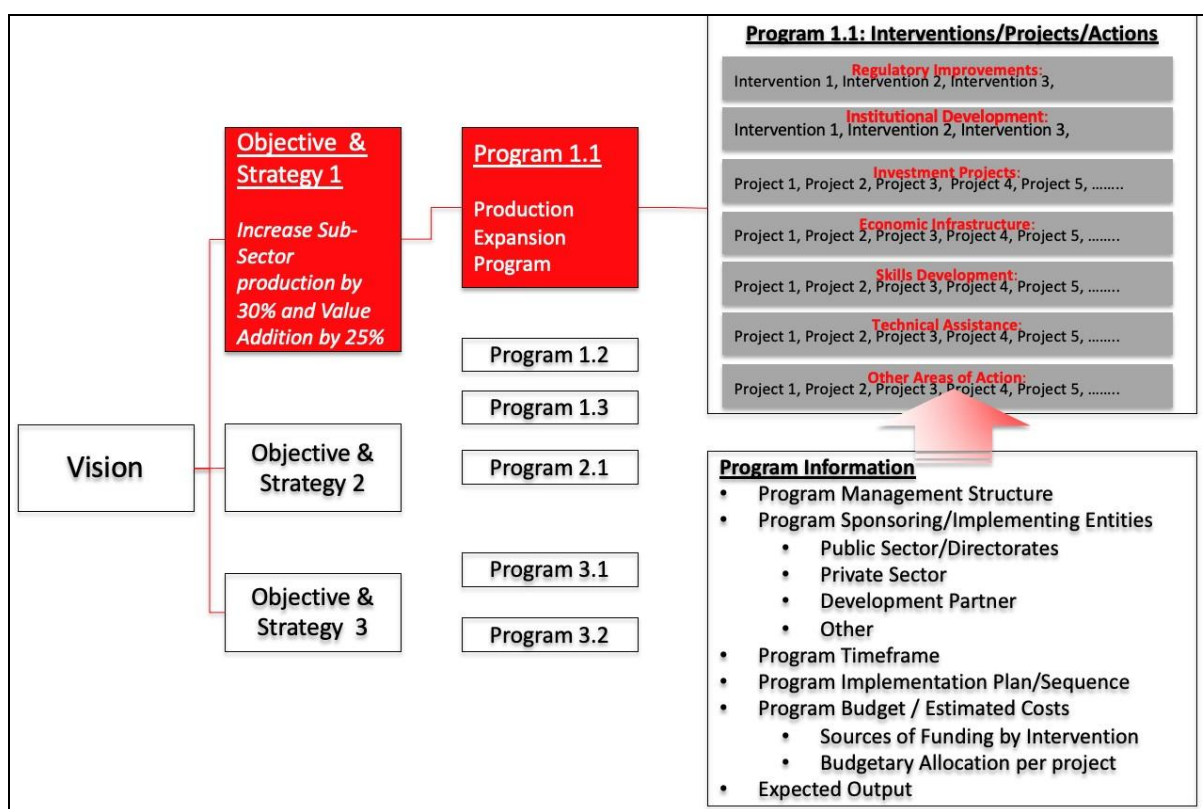
2.5 Conclusion

In conclusion, we have discussed the implications of the COVID-19 pandemic from the global and regional economic perspectives, how it affects Malaysia's economic performance, and focuses on the Perak social and economic development. The magnitude of distortions in demand and supply highlights the need to successfully manage the current pandemic and transition into the endemic phase, which is crucial in ensuring all economic activities and business can fully regain momentum. Perak state government also need to ensure the social implications of COVID-19 are not neglected so that no one is left behind.

PART 3 PERAK INDUSTRIAL DEVELOPMENT PLAN

The economic simulation for Perak state economic and social development for 2021 that were presented in the Interim Report indicated the economic growth for Perak is lower than the national economic growth rate forecasted by the Ministry of Finance's which is between 3% and 4%. Hence, there is a need for intervention programs in order to boost the performance of manufacturing sector and its related services. The intervention program is suggested based on the challenges and needs identified from economic and industrial analysis of each industry cluster. The intervention programs are developed based on the identified vision, objective and strategy of each industry cluster. Each intervention program explain the objective, justification, activities, time frame, lead agencies, estimated costs of implementation and the expected output. At least nine (9) intervention programs were developed for each cluster. The framework for intervention program is presented in Figure 3.0 below:

Figure 3.0: From Vision to Action Plan (Intervention Program)



3.1 Electricals and Electronic (E&E) Cluster

3.1.1 Vision

To strengthen E&E manufacturing ecosystems by attracting high-quality investment (HQI), promoting new technologies, uplifting the development of talent, as well as enhancing research and development (R&D) and design and development (D&D) activities towards National Investment Aspirations (NIA) agenda.

3.1.2 Objective

- To increase the value of high-quality new approved (realised) E&E investments (foreign direct and domestic direct investments) by 10% per annum.
- To enhance the participation of local SME input suppliers (upstream industry) of E&E by 10% per year.
- To strengthen human capital in the E&E industry by 10% per year (increase in the number of skills/semi-skills labour) through the upskilling and reskilling programme.

3.1.3 Strategy

- Strengthening private sector investment (FDI and DDI) involvement in the E&E industry by developing a new hub of Perak E&E industry and enriching international networking with E&E major world players.
- Sustaining the supply of raw materials of the various E&E supply chains and empowering E&E Vendor Development Programme.
- Enhancing talent and capability development programme by providing enough and competent workforce in the E&E industry

3.1.4 Focused Intervention Programs

These targeted intervention programmes include efforts to promote High-Quality Investment (HQI) in design and development (D&D) and front-end manufacturing that align with the National Investment Aspirations (NIA), to sustain raw materials in various E&E supply chains (including both upstream and downstream activities), and to empower the element of Environment, Social, and Governance (ESG).

Action Plan	Intervention Programme
Attracting High-Quality Private Sector Investment (FDI & DDI) in E&E sectors	<ol style="list-style-type: none"> 1. Develop new E&E hub at SVTP, Kanthan (Kinta), Lembah Beriah (Kerian) or Dennistown (Parit Buntar, Kerian), and AutoCity, Tanjung Malim (Muallim) 2. Improve the E&E ecosystem by creating a conducive business environment 3. Promote green E&E by attracting investment in solar photovoltaics (PV)
Developing and Enhancing Talent	<ol style="list-style-type: none"> 4. Develop talent through the empowerment and coordination of existing Perak's human capital agency 5. Establish Perak Microelectronics Training and Research Consortium 6. Enrich the collaboration between Industry and 4IR Agency/Centre
Sustaining Upstream and Downstream Activities	<ol style="list-style-type: none"> 7. Develop Perak Data Center 8. Empower local SME E&E companies to penetrate the world market and global value chain 9. Establish Perak Integrated Vendor Development Programme (PIVDP)

Intervention Programme 1

Development of new E&E Hub at SVTP, Kanthan (Kinta), Lembah Beriah (Kerian) or Dennistown (Parit Buntar, Kerian), and AutoCity, Tanjung Malim (Muallim)

Objective

To increase the value of new approved (realised) E&E investments (foreign direct and domestic direct investments - FDI and DDI) by 10% per annum.

Justifications

E&E segments in Perak are left behind compared with the other four states (Penang, Selangor, Johor, and Kedah). These four states have dominated more than 80% of the total number of E&E companies that have been established. Perak contributed 5% of the total number of E&E in Malaysia. Most of the E&E segments have concentrated on electronic components, EMS/Contract manufacturing, Industrial Electronics-System Electronics, LED, semiconductor, consumer electronics, industrial electrical, IR4.0/IOT/System integrator, and machine & equipment. The main product of E&E is semiconductor back-end and system/module/device, which are highly concentrated in Penang, Selangor, Kedah, and Johor. Given the current development in Penang and Selangor, which shortage of industrial land, Perak can take leverage this by offering the industrial land at three main investment corridors, Greater Kuala Lumpur (Tanjung Malim), Greater Ipoh (SVTP at Kanthan), and Greater Kamunting (Lembah Beriah, Kerian) and Parit Buntar (Dennistown, Kerian). These three corridors could be used for various E&E sub-segments. Greater Ipoh (SVTP at Kanthan), for example, can specialise in semiconductor and LED manufacturing. In contrast, Greater Kuala Lumpur (Tanjung Malim) can specialise in EMS and manufacturing-related services (MRS). Greater Kamunting (Lembah Beriah and Parit Buntar (Dennistown), Kerian) can specialise in solar photovoltaic (renewable energy) and LED. The concentration of sub-segment of E&E across these three corridors will become a game-changer to the rapid development of the E&E ecosystem in Perak and in line with the roadmap under National Investment Aspirations (NIA) that focuses on High-Quality Investment (HQI):

- Lembah Beriah and Parit Buntar (Dennistown), Kerian - given its strategic proximity to Penang and Kedah, it is ideal for establishing Perak's new E&E Hub. This new E&E hub will serve the entire value chain of E&E activities, both upstream and downstream. As a result, more local SMEs will be encouraged to become strategic partners of the major E&E businesses. Batu Kawan Industrial Park and Kulim Hi-Tech Park (KHTP) might be the greatest model for building Lembah Beriah and Parit Buntar E&E Hub. This is critical for the future growth of Perak's E&E sector and also in line with 'Rancangan Tempatan Daerah Kerian 2035' to strengthen Kerian District as a new E&E hub.
- Kanthan (Kinta) - given the strategic location and rapid development in this area, the new initiative to establish SVTP will accelerate Perak's economic growth through participating high-quality investors in E&E sectors and other industries. The significant industrial area of roughly 3 000 acres can be used for industrial concentration in high-tech sectors such as E&E, medical products and pharmaceuticals, unmanned aerial services (UAS), smart agriculture, and the digital economy.
- Tanjung Malim (Mualim) - has been known as Malaysia's automotive hub. Given the current development of electric vehicles (EV), the sub-sectors of E&E, namely electronic manufacturing system (EMS) and manufacturing-related services (MRS) companies, are suitable to be located here to supply the raw materials in the automotive industry. With a very strategic location near Selangor and Kuala Lumpur, and excellent infrastructures, this area can be a new E&E hub in EMS and MRS sectors.

The expansion of the E&E industry should focus on five main sectors, namely semiconductors, solar photovoltaic, light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services, according to the national E&E strategy. These areas are in line with Malaysia's current E&E and Perak strengths and the great potential of these sectors in the global market. As a result, a more comprehensive plan involving fiscal and non-fiscal incentives is necessary to attract the major companies in the five E&E essential sectors. The state of Perak should

make high-quality investment (HQI) a priority, in keeping with the existing national investment strategy, namely the National Investment Aspiration (NIA).

Activities, Implementation Schedules, Cost Estimates, and Lead Agencies

Activities	Time	Estimated cost*	Lead Agencies
<i>Establishment of Perak E&E Hub at SVTP Kanthan, Lembah Beriah and Dennistown (Kerian), and Tanjung Malim</i>			
i. Provide potential land area at (i) SVTP Kanthan, (ii)Lembah Beriah and Dennistown (Parit Buntar), Kerian, and (iii)Tanjung Malim. (Pilot project: 200 acres for each area)	June 2022 – Sep 2022	-	PKNPk, SADC Perak, MK Land
ii. Design the model of Perak E&E hub in three corridors	Oct. 2022- Dec 2022	RM100k	PKNPk
iii. Construction of the buildings for supporting SMEs - (Pilot project 20 premises (rented premises – Ready Build Factory (RBF)) for each area, and administration office).	Jan 2023- Jan 2025	RM50 million	PKNPk
iii. Upgrading infrastructure facilities, utility supplies and internet network - 4G/5G	Jan 2025- June 2025	RM5 million	PKNPk
iv. Launch of Perak New E&E Hub at three corridors	June 2025	RM50K	PKNPk
Total Estimated Cost		RM55.15 mil	

Expected Output

- Attract more than 100 new companies (local and foreign) in five E&E main sectors (semiconductors, solar photovoltaic, light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services (MRS))
- Create new jobs for more than 20 000 employees (high skills and semi-skills)
- Bring in new investments (realised FDI and DDI) in the E&E industry in the amount of RM10 billion
- Increase the ratio of FDI per Perak's GDP by 3% (the current share of FDI per GDP is 0.8%).

Intervention Programme 2

Improvement of the E&E ecosystem by creating a conducive business environment

Objective

To increase the value of new approved (realised) E&E investments (foreign and domestic direct investments - FDI and DDI) by 10% per annum.

Justification

The E&E ecosystem in Perak and the business environment are left behind compared with the other four states (Penang, Selangor, Johor, and Kedah). Excellent business environments in these four states have attracted many MNCs and local firms to establish their business. A conducive business environment will also reduce the cost of doing business and ease the doing business, attracting new investors to invest. Perak can leverage the development of Perak Silver Valley (PSV) as a new road map for the strategic planning of future economic development in all spectrum of high-quality manufacturing activities, high-tech agro-based industry, and digital economy. Thus, prudent strategic initiatives are crucial to attracting new/existing investors, particularly by creating a conducive business environment to ensure Perak is at par with the other four states.

Activities, Implementation Schedules, Cost Estimates, and Lead Agencies

Activities	Time	Estimated cost*	Lead Agencies
i. Upgrading the InvestPerak website	June 2022	RM 50 000	InvestPerak
ii. Upgrading the Infrastructure and digital technology in all areas of Perak Silver Valley (Internet connection - 4G/5G, IoT, IR4.0 and other infrastructure)	Dec 2022	RM 5 million	UPEN
iii. Integrate the facilities and support system - workers hostel, business centres, recreational, international school, ext.	Jan 2023	RM10 million	EPU
iv. Engagement Session (investment mission) with the potential investors (online and face to face)	Mac 2023	RM100 000	InvestPerak
v. Empower the role of the Investment Park Management Committee (IPMC)	Jun 2023	-	InvestPerak
vi. Continuous engagement with other's state investment authorities	Sep.2023	-	InvestPerak
Total Estimated Cost		RM15.15 mil	

Expected Output

- Bring in realised FDI and DDI new investments in the E&E industry by amount RM10 billion
- Increase the participation of local suppliers and local content by 20% per annum

Intervention Programme 3

Promoting Green E&E by Attracting Investment in Solar Photovoltaics (PV)

Objective

- To increase the value of new approved (realised) E&E investments (foreign direct and domestic direct investments - FDI and DDI) by 10% per annum.
- To improve the participation of local SME input suppliers (upstream industry) of E&E by 10% per year.

Justification

Manufacturing of PV equipment covering solar panels, solar cells, and modules. Under NIA, attracting investment in renewable energy has become the main agenda. Thus, solar photovoltaics (PV) has been identified as high-quality investments in E&E sectors. Thus, to attract potential investors, specific investment incentives to complement the federal and NCIA incentives can be offered by the Perak government.

Compared with Penang, Melaka, Kedah and Selangor, which have already established the solar photovoltaics industry, Perak is left behind in this industry. In Penang, three leading companies, Jinko Solar, JA Solar and TS Solartech, have been established. In Melaka, there are two solar PV companies, Auo Crystal, and Sunpower Malaysia Manufacturing, whereas Kedah and Selangor have one company, First Solar Malaysia and Hanwha Q Cells Malaysia, respectively. So far in Malaysia, no specific industrial area concentrates on the manufacturing of solar PV. Thus, the establishment of Perak Green Industrial Park at Lembah Beriah or Dennistown (Parit Buntar), Kerian, will speed up the transformation to renewable energy and empower the element of ESG in the industry. This new initiative is also in line with the national road map of the New Investment Policy.

In the ASEAN region, Indonesia will construct the world's largest green industrial park (currently spans 16 000 hectares with expansion plans of 30 000 hectares) at Bulungan Regency in North Kalimantan province with the collaboration between investors Indonesia, China, and the UAE. This park aims to attract producers of high-tech and precision products such as lithium-ion batteries, semiconductors, solar panels, green aluminium, and industrial silicon. Hydropower and solar panel plants will power the park, setting the model for developing a future green industrial park in the country. This initiative has expected to increase the share of renewable energy in the country's total energy usage by 23% by 2025.

The main activities of the solar value-chain are R&D and design, metal/silicon/polysilicon/ingot, solar wafer/cells, solar module, and system integrator. Perhaps, in the future, establishing a solar research institute in this area will become a game-changer for the solar PV industry in Perak by empowering all value-chain at the upstream and downstream activity. This initiative will also enhance a spill-over effect to supporting industries, like chemical and raw materials, equipment and machinery, industrial gas, and production supply, giving the economy a high multiplier. In this case, Perak can leverage through collaboration with the existing solar research institute in Malaysia, like SERI, UKM and UiTM Solar Research Institute.

Activities, Implementation Schedules, Cost Estimates, and Lead Agencies

Activities	Time	Estimated cost*	Lead Agencies
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Promoting Green E&E by Attracting Investment in Solar Photovoltaics (PV)		-	
i. Development of Perak Green Industrial Park at Lembah Beriah or Dennistown (Kerian)	Jan 2024	RM10 million	PKNPk
ii. Upgrading infrastructure facilities, utility supplies and internet network - 4G/5G	June 2024	RM5 million	PKNPk
iii. Collaboration with SERI, UKM and UiTM Solar Research Institute, and the existing solar PV companies at Penang and Kedah.	Sep 2024	-	InvestPerak
iv. Investment mission (online and face to face) to attract potential investors in solar PV	December 2024	RM100K	InvestPerak
v. Engagement Session with stakeholders to finalise the specific incentive for the Solar PV industry	Mac 2025	RM30K	PKNPk
Estimated Cost		RM15.13 mill	

Expected Output

- Attract 30 new companies in the Solar Photovoltaics value chain
- Give training to 100 solar energy engineers, and technicians
- Increase the participation of local manufacturers (local SMEs) in solar PV value-chain

Intervention Programme 4

Development of Talent through the Empowerment and Coordination of Existing Perak Human Capital Agency

Objective

To strengthen human capital in the E&E industry by 10% per year (increase in the number of skills/semi-skills labour) through the upskilling and reskilling programme.

Justification

The shortage of high-skilled talent, particularly in the E&E sectors, is the main challenge to sustaining this business. The new roadmap under NIA that focuses on five main sectors, namely semiconductors, solar photovoltaic, light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services, will need specific skills to meet industry needs. Thus, the availability and quality of talent need to be a serious concern as they impede the industry's growth. Thus, more engineers in design and development (D&D) and front-end manufacturing, mainly IC Design Engineers, Embedded System/Firmware Engineers, Radio Frequency Engineers, and Software Engineers, need to supply to meet the industry needs. Based on feedback from the industry, recent engineers with academic training are not matched with the demands of the industry. Thus, universities and vocational training institutes could respond by producing talent that suits the E&E sector needs by engaging with the industry in the curriculum or programme.

Perak needs to be forward-looking in planning the future talent that suits the industry's needs. Thus, the empowerment and coordination of the existing Perak human capital agency are crucial to coordinate the reskilling and upskilling through micro-credentials training/programme. These programmes/training match the stock of talent with the industrial needs, assist the companies by providing high-quality talent, and serve as an intermediary between industry and institution/higher learning institution. The state can leverage the existence of an R&D agency in the E&E sector, for example, Collaborative Research in Engineering, Science and Technology (CREST), which specialise in R&D&C in the E&E ecosystem. Other agencies, like MIGHT, MARii, and the Malaysian Semiconductor Industry Association (MSIA), can also plan the talent development among the fresh graduate or upskill and reskill the existing engineers/technicians.

The existence of some human capital development in Perak, for example, Perak Entrepreneur & Skills Development Center (PESDC), Pusat Aspirasi Anak Perak (PASAK), Advanced Technology Training Center (ADTEC Taiping), and Federation of Malaysian Manufacturers (FMM) Perak Branch are crucial to planning the suitable training/module with the industry and others government agencies. The E&E industry also can take leverage the existence of several higher learning, such as UTP, UTAR, Politeknik Ungku Omar, Politeknik Sultan Azlan Shah, Politeknik Bagan Datuk, and Institut Kemahiran MARA. These institutions play a pivotal role in updating the recent skills and technology through upskilling and reskilling of their student before joining the labour market. The specific training will provide qualified talent in the E&E industry that suits the industry's needs.

Activities, Implementation Schedules, Cost Estimates, and Lead Agencies

Activities	Time	Estimated cost*	Lead Agencies
i. Engagement session with PESDC, PASAK, ADTEC Taiping, and FMM Perak	June 2022	RM5k	InvestPerak
ii. Engagement session with anchor E&E Industry - CARSEM, Huatian Technology (Malaysia), formerly known as UNISEM, Murata, Yamaha, Scope Manufacturers, and AEL Engineering)	Sept 2022	RM10K	MIDA
iii. Engagement Session with Academia/Universities/Research Institution – UTP/UTAR/PUO	Dec 2022	RM10K	InvestPerak
iv. Designing the training module in E&E - Micro-credential programmes (focused on software engineering, programming, and design and development)	Mac 2023	RM100K	MIDA
v. Reskilling and Upskilling programme - 100 participants per programme (Programme quarterly basis - Four times per year)	June 2023	RM100K	PESDC/ADTEC
Total Cost		RM15.25 mill	

Expected Output

- Develop new technologies, design and development in semiconductors, solar photovoltaic, light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services (MRS).
- Give training to 1 000 semiconductors engineers
- Increase the participation of local manufacturers (local SMEs)

Intervention Programme 5

Establishing of Perak Microelectronics Training and Research Consortium

Objective

- To strengthen human capital in the E&E industry by 10% per year (increase in the number of skills/semi-skills labour) through the upskilling and reskilling programme.
- To increase the value of new approved (realised) E&E investments (foreign direct and domestic direct investments - FDI and DDI) by 10% per annum.
-

Justification

The semiconductor industry plays a significant role in contributing to the country's manufacturing export and creating more jobs; however, this sector lacks talent development programmes. Therefore, proper talent development for this industry is necessary because, so far, there is no specific agency responsible for planning and empowering the stock of talent in the semiconductor industry. Thus, in line with the NIA roadmap, the semiconductor is considered one of the high-quality investments prioritising uplifting talent development.

The talent shortage is the main challenge to sustaining this business in the future. Thus, establishing the Perak Microelectronics Training and Research Consortium is warranted as the state think-thanks to planning and coordinating all training necessary. This agency can make a special arrangement with the existing agency at the state and federal levels to coordinate the micro-credential course, particularly upskilling and reskilling.

Ongoing advancements in the Internet of Things (IoT), artificial intelligence (AI), wireless, and mobile technologies should continue to fuel demand in future. These digital technological shifts have benefited companies across the semiconductor industry's value chain. Yet, despite its impressive growth, the semiconductor manufacturing supply chain's ability to advance and thrive may now face serious challenges. The semiconductor industry's talent development must be sustainable to attract new investors and inspire existing investors to reinvest. At this crucial phase, the industry contends with an acute shortage of core skills and talent (skilled professional of labour) in digital business technologies (including automation, AI, analytics, and machine learning). Because the semiconductor industry is highly technical, it demands graduates with solid backgrounds in the science, technology, engineering, and math (STEM) fields. However, the industry has difficulty attracting new talent, including recent graduates. Thus, to close the talent gap, semiconductor companies should approach talent acquisition, retention, and skills development with the same rigour and focus on solving complex technological and operational challenges. The semiconductor manufacturing supply chain should nurture the talent required to generate continuous innovation and growth.

Activities, Implementation Schedules, Cost Estimates, and Lead Agencies

Activities	Time (4 to 5 Years)	Estimated cost*	Lead Agencies
i. Establish the Perak Microelectronics Training and Research Consortium - (with the collaboration between industry, academia/universities, and government agencies)	Dec 2022	RM50 000	InvestPerak
ii. Engagement/Collaboration with Federal and Other States Agency	Mac 2023	RM50 000	InvestPerak
iii. Design the training module with the collaboration between industry, universities, and government agencies - Triple Helix Model	June 2023	RM100K	InvestPerak
iv. Empower the microelectronics research with a collaboration between potential universities in microelectronics - anchor university UTP/UKM/USM	Sep 2023	RM50k	MIDA
iv. Establish a joint public-private E&E research endowment fund	Dec 2023	-	MIDA
vi. Design the university curriculum/programme	Jan 2024	-	MIDA
Estimated Cost		RM250k	

Expected Output

- Develop new technologies, design and development in semiconductors, solar photovoltaic, light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services (MRS).
- Provide training to 1 000 semiconductors engineers
- Increase the participation of local manufacturers (local SMEs)

Intervention Programme 6

Enriched the collaboration between Industry and 4IR Agency/Centre

Objective

- To strengthen human capital in the E&E industry by 10% per year (increase in the number of skills/semi-skills labour) through the upskilling and reskilling programme.
- To increase the value of new approved (realised) E&E investments (foreign direct and domestic direct investments - FDI and DDI) by 10% per annum.

Justification

To encourage the E&E sectors towards IR4.0 and IoT, that need government's direct involvement at the federal and state levels. The government may provide research grants and expertise to the potential E&E industry. Since the investment in IR4.0 and IoT is costly and risky, thus government agencies need to play an active role by collaborating with the industry. Specific tax, monetary incentives and research grants also can be considered to encourage more participation from the industry. Therefore, the Perak state and E&E industry must collaborate intelligently with CREST, MARII, and MIGHT. This agency can help the industry move towards IR4.0 and IoT. Thus, the E&E companies in Perak can take leverage to apply the BNM's Fund for SMEs (High Tech Facility - National Investment Aspirations (HTF-NIA)). This fund supports the high-tech and innovation-driven SMEs best aligned to strategic long-term development goals embedded in the National Investment Aspirations (NIAs). The fund's main objective is strengthening Malaysia's competitive positioning in global value chains, preserving the supply chain ecosystem, and safeguarding high-skilled jobs. The primary role of special Unit IR4.0 at Invest Perak is to coordinate and assist the industry towards high-tech technology by providing unique expertise in system integration and IoT, intelligent data analytics, modelling and simulation, and mixed reality and human-computer integration. For the starting point, this unit can collaborate with the UKM Institute of IR4.0 (IIR4.0) and UKM Akademi Siber Teknopolis (AST).

Activities, Implementation Schedules, Cost Estimates, and Lead Agencies

Activities	Time (1-3 Years)	Estimated cost*	Lead Agencies
Enriched the collaboration with 4IR Agency/Centre			
i. Establish Special Unit IR4.0 at InvestPerak	June 2022	-	InvestPerak
ii. Incentivising Industry to reskill and upskill employees in the 4IR area	Dec 2022	-	MIDA
iii. Engagement Session with 4IR centre in Malaysia - UKM Institute of IR4.0 (IIR4.0) and UKM Akademi Siber Teknopolis (AST)	Mac 2023	-	InvestPerak
iv. Engagement Session with CREST, MARII, and MIGHT	Jun 2023	-	InvestPerak
Estimated Cost		-	

Expected Output

- Develop new technologies, design and development in semiconductors, solar photovoltaic, light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services (MRS).
 - Train 1 000 EMS and MRS engineers
 - Increase the participation of local manufacturers (local SMEs)
-

Intervention Programme 7

Develop Perak Data Center

Objective

- To improve the participation of local SME input suppliers (upstream industry) of E&E by 10% per year.
- To strengthen human capital in the E&E industry by 10% per year (increase in skills/semi-skills labour) through the upskilling and reskilling programme.

Justification

A complete data analytics is crucial in decision-making and future planning. Since there is low participation of local vendors and small involvement of local SMEs in the E&E industry at Perak, data centre is critical to plan the sustainability and strengthen the E&E value chain with the participation of local suppliers. Future planning and improvement can be done through data analytics to identify the potential anchor and vendors in E&E in Perak, and evaluate the participation of the local SMEs. In addition, the data centre also provides the information of existing company's, potential investor (local and abroad), the information of cost of doing business in Perak, and the stock of talent in Perak for training purposes.

Activities, Implementation Schedules, Cost Estimates, and Lead Agencies

Activities	Time	Estimated cost*	Lead Agencies
i. Collect the information of E&E ecosystem in Perak from all value chain (upstream and downstream activity), potential investors, and stock of talent.	June 2022	-	InvestPerak
ii. Design the online database	Dec 2022	RM100K	InvestPerak
iii. Construction online database	June 2023	RM100K	InvestPerak
iv. Launch of Perak E&E Data Centre	June 2023	RM50K	InvestPerak
Total Estimated Cost		RM250K	

Expected Output

- Increase the participation of local manufacturers (local SMEs) in the value-chain of E&E ecosystem
 - Increase the international engagement with the potential worldwide investors
-

Intervention Programme 8

Empower local SME E&E companies to penetrate the world market and global value chain

Objective

- To improve the participation of local SME input suppliers (upstream industry) of E&E by 10% per year.
- To increase the value of high-quality new approved (realised) E&E investments (foreign direct and domestic direct investments) by 10% per annum.

Justification

Local SME E&E companies in Perak have limited access to the global value chain. Most companies are focused on the domestic market (back-end manufacturing). The domestic content of gross export in Malaysian E&E is significantly lower than in other sectors, indicating that the E&E relied on imported raw materials. The involvement of local SME E&E companies in the international market is limited and insignificant in contributing to the global value chain. The critical issue with local E&E in Malaysia (especially in Perak) is the low value-added, low degree of economic linkages, and low domestic content for E&E export. Domestic participation in the gross export of the E&E market is also relatively low than the Asia Pacific (APAC) average. The domestic content for Malaysians is 32%, compared to 68% for APAC countries. The labour productivity of local SMEs is also relatively low than MNCs. Thus, a forward-looking strategy is warranted to increase the breadth and depth of the Perak SME in the E&E supply chain.

Activities, Implementation Schedules, Cost Estimates, and Lead Agencies

Activities	Time	Estimated cost*	Lead Agencies
Empower local SME E&E companies to penetrate the world market and global value chain			
i. upskilling and reskilling the E&E local SME - short-term course and micro-prudential course	June 2022	RM50k	MIDA
ii. Enrich the world partnership through a collaboration programme	Dec 2022	RM100k	MIDA
iii. Upgrading and improving the adoption of the technology through sharing sessions (best practices), training, and research collaboration)	Jan 2023	RM 100k	InvestPerak
iv. Enhance the online resources to support decision making	Sept 2023	RM50k	InvestPerak
v. Enhanced the industry utilisation of Free Trade Area (FTAs)	Dec 2023	RM50k	MIDA
Total Estimated Cost		RM350k	

Expected Output

- Increase the participation of local SMEs E&E in the global value chain.
 - Give training to local SME E&E companies
 - Increase the collaboration between local SME E&E firms with worldwide E&E companies
-

Intervention Programme 9

Establish Perak Integrated Vendor Development Programme (PIVDP)

Objective

- To enhance the participation of local SME input suppliers (upstream industry) of E&E by 10% per year
- To increase the value of high-quality new approved (realised) E&E investments (foreign direct and domestic direct investments) by 10% per annum

Justification

In Perak, the role of domestic SME's in the supply chain of E&E is limited. Most companies import the raw materials from abroad or buy from local suppliers in other states (Penang and Shah Alam). Thus, this gives minimum participation of local SME's, and minimum effect to backward and forward linkages. Industries claim that very hard to get the supplier from Perak. To solve this, the State government can intervene by imposing regulations that E&E companies need to meet the minimum percentage of local content (for example, raw material) from local SME's. This can be done by establishing Perak Integrated Vendor Development Programme (PIVDP) in the industry. However, the Perak government needs to identify the potential anchor company in the E&E industry, plan the Vendor Development Roadmap, and monitor the programme to ensure that the VDP benefits both parties. Thus, the database of potential anchors and vendors in the E&E sector is required to plan the VDP accordingly. The establishment of PIVDP also handles the central issue in manufacturing industries, namely the low domestic value-added and low domestic content in manufacturing. This can extend the E&E sectors' domestic linkages, indirectly enhance domestic participation in the global value chain, and strengthen the Vendor Development Programme. In addition, this initiative also will provide a platform to accelerate the MNC-local partnerships in the targeted high-value-added project. PIVDP will assist and train all potential vendors in E&E and identify the potential anchor company in E&E sectors. PIVDP also helps and advises both parties (anchors and vendors), particularly the agreement to use local content (domestic raw material/supplier) for the business.

Activities, Implementation Schedules, Cost Estimates, and Lead Agencies

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
i. Establish a Special Unit of Perak Integrated Vendor Development Programme	Jan 2023	-	MIDA
ii. Engagement Session With Anchor Industry and Potential Vendors	Mac 2023	RM10 000	MIDA
iii. Preparing Training Module for Vendor	Jun-Dec 2023	RM100 000	MIDA
iii. Launching of Perak Integrated Vendor Development Programme	Jan 2025	RM10 000	MIDA
Estimated Cost		RM120k	

Expected Output

- Train 500 potential (or existing) vendors in E&E sectors
 - To produce 500 new vendors (local SMEs) in the upstream and downstream of the E&E value chain
 - Increase the element of local content in the value-chain of E&E sectors
-

3.2 Automotive Cluster

3.2.1 Vision

To become one of the leading investment destinations in energy efficient vehicle and next generation vehicle in Malaysia.

3.2.2 Objective

- To increase year on year growth of automotive cluster the state's GDP by 10%
- To increase the contribution of automotive cluster to the state's total export by 5%

3.2.3 Strategy

- Increase investment in automotive sector through existing and new subsector
- Enhance revenue by strengthen automotive ecosystem in Tanjong Malim.
- Increase attraction of Tanjong Malim as preferred location by improving infrastructure and utility supply

3.2.4 Focused Intervention Programs

For the automotive cluster, the intervention programs aim to make Tanjong Malim a preferred investment location for the automotive sector in Malaysia. In doing so, the intervention programs are focusing on the development of strategic policy, world class infrastructure and conducive ecosystem of the automotive industry including the creation of comprehensive supply chain activities. All these developments are based on sustainable practices and are future oriented. The implementation will be done following the concept of triple helix through three spheres of collaboration among public, private and institution (universities/higher learning institutions). Although the future automotive industry is advancing toward green technology (EEV) and digitalization (NxGV/MaaS), the traditional internal combustion engine (ICE) sub sector will remain a significant sub-cluster in the next 10 years in Malaysia.

Action Plan	Short Term Plan	Mid Term Plan	Long Term Plan
Increase domestic and foreign direct investment in automotive	1. Improve automotive policy based on the long term strategic plan	4. Promote Tanjung Malim as investment destination for EEV and ICE	7. Develop Tanjung Malim as preferred city to live especially for the youth.
Strengthen automotive ecosystem in Tanjung Malim	2. Develop comprehensive EEV supply chain plan.	5. Establish supporting industry such R&D lab and data center.	8. Develop and retain talent.
Improve infrastructure and utility supply	3. Large scale renewable energy plant	6. Build EV charging station, MaaS infrastructure and connection points of various mode of transportations.	9. Promote Tanjung Malim as Transportation Hub of northern Klang Valley

Intervention Program 1

Improve automotive policy based on the long-term strategic plan.

Objective

To increase the year on year growth of automotive cluster the state's GDP by 10%

Justification

The policy development aims for the ICE and the new subsector EEV. Nevertheless, Malaysia is lagging behind its neighbors especially Thailand and Indonesia in term EEV policy and road map. For example, Thailand has introduced a policy whereby all passenger vehicle sold in Thailand by 2035 will be EV that is locally produced. Attractive incentives are provided to foreign investor including tax break, land ownership and foreign talent. Therefore, Malaysia needs to reevaluate existing policy EV subsection. In particular, competitive incentives and a clear road map must be prepared so as to attract investors to invest in EEV. The aim is to increase investment by existing and new firms especially big export oriented foreign players. Although our interview data indicates that Malaysia has already mapped the plan but the official document has yet to be released.

Activities, Implementation Time tables and expected cost

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
Roundtable discussion with stakeholders including the government and industrial players.	Jun – July 2022	-	Invest Perak
Reevaluation of existing automotive policy for improvement wherever necessary especially the incentives and the clear road map of EEV policy and implementation.	July – Nov 2022	RM200K	Invest Perak
Discussion/negotiation with Malaysia International Trade and Industry.	Nov - Dec 2022	-	Invest Perak
Total		RM200K	

Expected output

- Increase in domestic and foreign investment including by existing and new firms in ICE (tiers 1, 2 and 3) and EEV subsector (OEM and component manufacturers).
 - Increase in the production of EEV.
-

Intervention Program 2

Develop comprehensive EEV supply chain plan

Objective

To increase the year on year growth of automotive cluster the state's GDP by 10%

Justification

Automotive vehicle is a complex product with thousands of parts and components. However, to ensure continuous supply of productions to meet demand, efficient supply chain is critical. Disruption in the supply chain will delay production. This happened during the movement control order due to the Covid19 pandemic whereby the disruption of automotive component production such as microprocessor chip has caused worldwide delay in vehicle production. As a measure for risk management, the OEM relies on regional supply chain. Due to the pandemic now increasingly automotive companies are setting up plants in ASEAN countries. Likewise, the development of efficient supply chain within Malaysia is very important as risk management measure as well as enhancing the automotive capabilities and technology within the country. This program aims to develop Tanjong Malim as an automotive hub that include all levels of supply chain for ICE and especially for a growing new subsector EEV. Since Proton City which is anchored Proton has been develop to include industrial area for Tiers 1 to 3 companies, the intervention program 2 specifically aim for EEV.

Activities, Implementation Time tables and expected cost

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
Prepare comprehensive planning on development of EEV ecosystem in Tanjong Malim	Nov – Dec 2022	-	Invest Perak
Analysis of best practice on EEV industrial sub-cluster ecosystem	Jan – March 2023	RM100K	Invest Perak
Promote Tanjong Malim as EEV investment location for domestic and regional production center.	April 2023 – March 2025	RM2 mill	MIDA
Total		RM2.1 mill	

Expected output

- A comprehensive master plan for EV industrial development.
 - Increase number of companies located in Tanjong Malim
-

Intervention Program 3

Develop renewable energy supply.

Objective

To increase the contribution of automotive cluster to the state's total export by 5%

Justification

In line with the global movement toward sustainable development, particularly renewable energy, this intervention program aims to increase the supply of energy from renewable sources. This will encourage not only the local manufacturers to use renewable energy at their plants but also to attract major foreign players in the automotive industry to invest on a large scale in Tanjong Malim. This is especially critical if the state wants to develop a hub of EV manufacturing and related services in Tanjong Malim. At the moment, the closest solar farm to Tanjong Malim is Gading Kencana Solar Power Plant which is located in Bidor or 60 km from Proton City. The proposed location of the solar energy plant is in Muallim district and will be integrated with the automotive hub of Tanjong Malim. The hub requires a large and reliable supply of electricity.

Activities, Implementation Time tables and expected cost

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
Identify the energy consumption of the industry and household today and in the future.	Jan – March 2023	RM50K	Invest Perak
Roundtable discussion with industry for the initiation of renewable energy production and project the amount will be produced individual by the company as well the amount that state government need to produce via private investment.	April – Sep 2023	RM100K	Invest Perak
Identification of site and potential investors.	Oct – Dec 2023	RM50K	Invest Perak
Total		RM200K	

Expected output

- Increase supply of electric using renewable energy plant.
-

Intervention Program 4

Promote Tanjong Malim as investment destination for EEV and ICE

Objective

To increase the year on year growth of automotive cluster the state's GDP by 10%

Justification

This intervention program aims to enhance Tanjong Malim potential as investment location for automotive sector. Promotion campaign especially for foreign and new investor and new subsector EEV and related services is very critical to realize the strategic plans developed a priori. This is because other countries and states in Malaysia aggressively doing promotion. States like Selangor, Penang and Johor are already known to investors locally as well as globally and have unique advantages that Perak in particular Tanjong Malim do not have. Therefore, the State of Perak need to identify the selling points and heavily promote to global players. For example, Menteri Besar Incorporation (MBI) of Selangor through Invest Selangor Berhad is aggressively promoting Selangor through online seminar and conferences, and promotional campaign roadshow such as that at Dubai Expo 2022.

Activities, Implementation Time tables and expected cost

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
Developing a targeted promotion campaign	Jun – Oct 2022	RM500K	Invest Perak
Strengthening the Pangkor Dialogue as promotional event to attract investors.	Oct – Dec 2022	RM1 mill	Invest Perak
Roadshow at selected Expo etc.	Jan 2023 – Dec 2025	RM500K	MIDA
Total		RM2 mill	

Expected output

- Number of foreign investor invests in Perak.
-

Intervention Program 5

Establish supporting industry such R&D lab, data center and electric and electronic industry.

Objective

To increase the year on year growth of automotive cluster the state's GDP by 10%

Justification

As the industry is moving toward new subsector EEV and Mobility as a Service (MaaS), supporting industry must be established to ensure the conducive ecosystem. For the EV infrastructure such battery charging station is most critical. On the other hand, MaaS which is future of human mobility requires data center. The EEV and MaaS need demand software, electronic and electrical components and therefore the support of electric and electronic sectors. All of these technologies and infrastructures in need of technology development hence the R & D centers.

Activities, Implementation Time tables and expected cost

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
Develop plan including mapping for the establishment of charging stations for EV in Perak.	Jun – Dec 2022	-	PBT
Develop master plan for data center, identify the potential investors and the location of the data center.	Jun 2022 – Jun 2023	RM200K	Invest Perak
Roundtable discussion with MARii and IPT for the establishment of R&D center and facilities in Tanjong Malim.	Jun – Dec 2022	-	Invest Perak
Develop industrial areas for electric and electronic sectors including battery EV (BEV) plants in Muallim.	Jan 2022 – Dec 2024	RM5 mill	PKNP
Total		RM5.2 mill	

Expected output

- Number of EV charging station
 - The establishment of the facilities and infrastructures.
-

Intervention Program 6

Build EV charging station, MaaS infrastructure, 5G communication facility and connection points of various mode of transportations.

Objective

To increase the year on year growth of automotive cluster the state's GDP by 10%

Justification

Infrastructure development is critical to ensure the implementation of the policy and attract potential investor. Therefore, infrastructure to support EV and MaaS must be developed a priori. Among the most important infrastructure that is not yet available or developed include EV charging stations and hubs, 5G communication facility and connection points (stations) of various mode of transportation such as train, bus, taxi and e-hailing. These facilities together with transportation stations will connect transportation modes physically as well as the system through cloud, software and data center. The charging station can be both independent by itself and integrated with other facilities such as transportation hub, shopping mall and lifestyle facilities. The important point is the locations must be strategic and convenience as well as ensure efficient human mobility connection.

Activities, Implementation Time tables and expected cost

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
Based on the road map and the sale projection of EEV and MaaS, prepare implementation plan time tables of the infrastructure.	Jan – March 2023	-	Invest Perak
Study the technology requirement in the long run through roundtable discussion, consultative session, best practice and document review. This includes the potential investors.	April 2023 – Dec 2024	RM500K	Majlis Daerah
Design the town planning that includes the strategic location of the infrastructure in District Muallim and Perak in general.	Oct 2023 – Jun 2024	-	PBT
Total		RM500K	

Expected output

- Established infrastructure for EV and MaaS.
-

Intervention Program 7

Develop Tanjong Malim as preferred city to live especially for the youth.

Objective

To increase the contribution of automotive cluster to the state's total export by 5%

Justification

One of the key factors to develop industry is the development of a city that has all the sport facilities, community centers, housing and green parks. In addition, the city should also have economic establishments such as businesses, shopping complexes, international hotel chains, private health care, entertainment etc. In addition to existing institutions of higher learning such as UPSI and Polytechnic as well as the primary and secondary schools, availability of international education institutions at primary, secondary and higher levels are an added advantage. These not only fulfill the need of the local but also foreign expatriate and visitors, and therefore attract talents needed by the industries. The development concept is also based on the strategic plan to make Tanjong Malim an automotive city, education city, youth city and satellite city.

Activities, Implementation Time tables and expected cost

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
Develop a master plan for Tanjong Malim city	Jun – Dec 2022	-	PBT/PKNP
Roundtable discussion with stakeholders including industry and Proton	Jun – Dec 2022	-	PBT/PKNP
Identifying potential partner from the private sector	Jan – Dec 2023	-	PBT/PKNP
Develop the city in stages through public-private initiative.	Jan 2024 - Dec2030	RM100 mill	PBT/PKNP
Total		RM100 mill	

Expected output

- A developed Tanjong Malim as a city with complete facilities and establishments
 - Increase number of investors to Tanjong Malim
-

Intervention Program 8

Develop and retain talent.

Objective

To increase the year on year growth of automotive cluster the state's GDP by 10%

Project Justification

This intervention program aims to attract talent to work and live in Tanjong Malim, especially the young generation and include foreign expatriates. In particular, for the EV industry and MaaS related companies. In the future the industry will need talent with new and different skills than what we have today. In doing so, the triple helix concept through the collaboration among government, industry and university/technical institutions is the concept that can be implemented in Perak. Other programs mentioned earlier also serve as a support to this program.

Activities, Implementation Time tables and expected cost

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
Roundtable discussion with university, technical training institution and industry	Jun 2022	-	University/Institution
Development of program and training modules collaboration between university/institution and industry.	July 2022 -Jun 2023	RM100K	University/Institution
Total		RM100K	

Expected output

- Increase the number of automotive related degree programs and short training certificates developed with university, training institutions and industry.
-

Intervention Program 9

Tanjong Malim as Transportation Hub of northern Klang Valley

Objective

To increase the year on year growth of automotive cluster the state's GDP by 10%

Justification

This intervention program is consistent with intervention programs 6 and 7. This program aims to develop Tanjong Malim as transportation hub for Northern Selangor and Southern Perak. In line with the ECER master plan to develop Tanjong Malim as a satellite city, the transportation hub will play a critical role. The transportation hub will be developed based on the concept of integrated station for commuter, high speed train, long distance (express) and city buses, taxi and e-hailing. The hub will have facilities such as shopping complex, EV charging station, hotels, and entertainment centers. It will be equipped with Wi-Fi and 5G connection that allow the various mode of transportation to be integrated and connected via cloud.

Activities, Implementation Time tables and expected cost

Activities	Time (3-5 Years)	Estimated cost*	Lead Agencies
Developed the design of the transportation hub.	Jun – Dec 2022.	RM50K	PBT
Roundtable discussion with the stakeholders to ensure that the hub cater all the needs and requirement of customers, businesses and other closely related parties.	Jan – Jun 2023	-	PBT
Develop the hub in phases via public-private initiative	Jan 2024 – Dec 2027	RM10 mil	PKNP
Total		RM10.05 mil	

Expected output

- Increase number of new investor in Tanjong Malim
-

3.3 Mineral-based Cluster

3.3.1 Vision

To revitalize mineral-based industries in Perak to generate revenue and attract (domestic and foreign) investment.

3.3.2 Objective

- To increase the production of mineral-based products by 7% CAGR per annum¹
- To improve transport infrastructure and ICT interconnectivity
- To increase GDP per capita via the creation of high-tech skilled job opportunities in the mineral-based industry.

3.3.3 Strategy

- Promote production of mineral-based downstream products and sustainable and responsible mining (SRM) plus upstream with the participation of global industry players.
- Improve transport infrastructure and ICT connectivity in high-impact industry areas via private-public partnerships.
- Promote the adoption of Industry 4.0 technologies to improve production efficiency and productivity in the medium and long terms.

¹ Business Research Company (BRC) - The global metal and mineral market is expected to grow from \$6320.71 billion in 2020 to \$6937.72 billion in 2021 at a compound annual growth rate (CAGR) of 9.8%. The growth is mainly due to the companies rearranging their operations and recovering from the COVID-19 impact, which had earlier led to restrictive containment measures involving social distancing, remote working, and the closure of commercial activities that resulted in operational challenges. The market is expected to reach \$9021.86 billion in 2025 at a **CAGR of 7%**.

Source: BRC at <https://www.thebusinessresearchcompany.com/report/metal-and-mineral-global-market-report-2020-30-covid-19-impact-and-recovery>

3.3.4 Focused Intervention Programs

The focused intervention programs encompass the focus of mineral-based industries on creating higher values from downstream products by leveraging Lumut Port System (LMT 1 – 3 and transshipment facilities) as the regional transshipment and Industry 4.0 technologies (I4.0tech) hub. The transformation will require an approach and an ecosystem that involve global industry players in the upstream (feeder) and downstream products. The adoption of I4.0tech will be accomplished through the strategic alliances with global industry players to provide knowledge and technology transfer and training and upskilling of the local talents. For the mineral-based industrial cluster, UKM Pakarunding proposes 9 intervention programs aimed at achieving the above vision, objectives, and strategies.

Strategies	Intervention Programs
Promote production of mineral-based downstream products and sustainable and responsible mining (SRM) with the participation of global industry players	<ol style="list-style-type: none"> 1. Forge alliance with major global players in upstream and downstream products through M&A, to attract FDI and accommodate technology transfer to local players (TIM 2021-2030 Plan). 2. Position the 2nd PHIP@Silvervalley for downstream mineral-based industries in the LUMIC Industrial Areas. 3. Develop 2 industrial areas for SRM and upstream industries: 1) NR-REE at Kenering, Gerik and 2) limestone at Sungai Raia, Simpang Pulai.
Improve transport infrastructure and ICT connectivity in high-impact industry areas via private-public partnerships	<ol style="list-style-type: none"> 4. Upgrade land connection from remote/rural areas with SRM and upstream industry potential (Pengkalan Hulu through Kenering, Gerik and Simpang Pulai to Lumut Port) 5. Empower LMT to accelerate the development of Lumut Port System with LMT 2 and LMT 3 to accommodate increases in international vessels. 6. Improve internet access in industrial areas to facilitate remote working in the new norms and to enable adoption of I4.0tech
Promote the adoption of Industry 4.0 technologies to improve production efficiency and productivity in the medium and long terms (12MP)	<ol style="list-style-type: none"> 7. Attract high-skilled, high-tech talents back to Perak to support the development of downstream product industries 8. Encourage recruitment of hire high-skilled talents from global industry players and foreign countries. 9. Provide tax incentives for companies to train workers with digital technologies aimed at improving productivity

Intervention Program 1:

Forge alliances with global players in SRM/upstream and downstream industries, including through M&A, to attract FDI and accommodate technology transfer to local players.

Objective:

To increase the production of mineral-based products by 7% CAGR per annum

Justification:

Perak is rich in mineral resources, but the mineral-based industry (basic and fabricated metal and non-metallic mineral products) have contributed more (23.4%) to the State's economy and attracted around 16.5% foreign and local direct investment (FLDI). Perak can realize higher value from its mineral-based industry by focusing on producing downstream products. LMT has developed an extensive plan to develop their terminal systems (LMT2 is progressing to the 2nd and 3rd phases, and then LMT3), with 5 Lumut Maritime Industry City (LuMIC) projects. Perak can leverage LMT Development Plan to attract local and global investors in mineral-based downstream industries into the state and prevent revenue leakages as glocal (global and local) industry players prefer to set up their upstream and downstream facilities in neighbouring states with port facilities. To attract these glocal industry players, Perak must launch Perak's Glocal Direct Investment (PGDI) campaigns, featuring mega exhibitions of the three flagship projects:

1. Lumut Port as a "global riverine port for global business"
2. 2nd PHIP at LuMIC industrial areas (most suitable at LPIP 2 within LUMIC 4 plan) as the new hub for mineral-based downstream industries.
3. 2 Mineral-based Industrial Parks
 - MBIP-Kenering, Gerik and (160km to LMT vs 125km to Penang Port)
 - MBIP- Simpang Pulai, Sungai Raia (80km to LMT vs 158km to Penang Port)

Activities, Timeline and Cost Estimation

Activities	Period	Cost	Lead Agency
Reactivate and rebrand Pangkor Int'l Development Dialogue (PIDD) to Perak International Business Development Dialogue (PIBDD) to be organized at least twice until 2023 ¹	Sept 2022 - Dec 2023	RM4 mill	Invest Perak, ENR (MBI), LMT and PKNP (developer)
Organize government-to-business (G2B) talks, targeting global industry players in Malaysia	Jan 2023 – Dec 2023	RM 1 mill	Invest Perak, ENR (MBI), LMT and PKNP (developer)
Active participation in overseas business campaigns	Jan 2023 – Dec 2023	RM 2 mill	Invest Perak, ENR (MBI), LMT and PKNP (developer)
	Total	RM7 mill	

Note: IDR (Institute Darul Ridzwan). PKNP (Perak State Development Corporation). Cost of PIDD based on NCIA contribution for PIDD2015 (<https://www.thestar.com.my/metro/community/2015/02/12/rm15mil-to-support-pangkor-international-development-dialogue>).

Expected Output:

- Increase FDI in the mineral-based manufacturing subsector
 - Increase the number of global players setting up their facilities (FDI) in Perak, in the existing sites but particularly in the newly established industrial parks
-

Intervention Program 2:

Position the 2nd high-tech PHIP@Silver valley (or LPIP 2 in LuMIC 4) for downstream mineral-based industries in the LuMIC Industrial Areas.

Objective:

To increase the production of mineral-based products by 7% CAGR per annum

Justification:

In addition to the existing concentrated mineral-based industries in the Kinta district, a high-tech PHIP in the LuMIC (LPIP) area offers the most strategic location to promote production of downstream products among global industry players. Participation of local industry players in this area, especially among SMEs in the foreign-local alliances is key to technology transfers. Two industrial areas are best suit for the 2nd high-tech PHIP@silvervalley mineral-based downstream industries:

1. LuMIC1 is an operating plan in Kampung Acheh, situated next to the LMT (197 acres terminal including more than 100 acres of container yard), the fully-occupied LPIP and in the plan of developing a new 150-acres industrial area.
2. LuMIC4 is strategically located within in-progress LMT2 and planned LMT3 projects with LPIP2 - 316.6 hectares/782.3 acres industrial area (mostly are State or GLC owned lands).

This foreign-local program fits one of the main strategies laid out in the National Mineral Industry Transformation Plan 2021-2030, in which international cooperation will be explored to facilitate technology transfers and foreign investment (FDI) in the mineral subsector and mineral-based manufacturing subsector. Also, under Strategy D Priority Area of the 12MP, the role of industrial areas is enhanced by improving the attractiveness and investments in these areas. By introducing a state-of-the-art PHIP in industrial areas with access to the upgraded Lumut Port facilities, the State can adopt the MSC model of exploiting raw materials (tin ores) from Pengkalan Hulu and transporting them to their processing plant in Butterworth to gain access to the Penang Port.

Activities, Timeline and Cost Estimation

Activities	Period	Cost	Lead Agency
Identify and recruit global industry players and participate in Perak direct investment campaigns	Aug - Dec 2022	RM100,000	LMT/Invest Perak
Establish 150 acres LPIP 2 as the MB-downstream industrial park Offered in 15 lots of 10 acres to foreign & local investors @RM49sqft ² Price per lot = RM21,344,400/10 acres Total area = 150 acres = 6,535,000 sqft	Jan 2023 – Jun 2023	RM400,000 LPIP 2 land is owned by State and GLCs (RM320.1 mill - recover cost from the sale of lots)	LMT & IP and MB Inc.
Develop the PHIP with world-class infrastructure including the HSBB and 5G networks @RM0.5 mill/lot (1 lot ~ 10 acres)	Feb - Jul 2023	RM7.5 million	LMT & MCMC
	Total	RM8 mill	

Notes:

1. Price of the industrial lot at LPIP (10.3 acres for RM22 million) <https://www.edgeprop.my/listing/sale/1635483/perak/lumut/industrial/industrialland/10.3-acres-lumut-port-industrial-land>. LPIP is operating on a 1000 acres area, now with 92 companies operating, 30% are foreign companies. Its lot is offered as a 10.3-acre area.

Expected Output:

- Increase in the number of global players in high value-added products to set up their facilities in PHIP2@Silvervalley
- Increase in the number of local players in high value-added products to set up their facilities in PHIP2@Silvervalley

Source: Halatuju Pembangunan Perak 2040 (https://www.mbi.gov.my/sites/default/files/4_lp_strategi_jun.pdf)

Intervention Program 3:

Develop two industrial areas for SRM and upstream industries for 1) NR-REE at Kenering, Gerik and 2) limestone at Simpang Pulau, Sungai Raia.

Objective:

To increase the production of mineral-based products by 7% CAGR per annum

Justification:

Perak has large deposits of high-quality rare-earth elements (HREE) that can contribute to the State's revenue. These HREE are extracted from monazite sand and xenotime, which Perak has a large deposits¹. The HREE contains 17 elements, i.e., 15 elements in Lanthanide, scandium and yttrium), that are high value and highly-sought REE (HREE). However, because some REEs contain radioactive elements that impose serious health risks to the surrounding population and workers, they must be done with sustainable and responsible mining (SRM) following the SOP of NR-REE mining (2022) to be conducted in large-scale mining projects. Monazite contains high thorium (radioactive) element and thus recommended for exports. Meanwhile, xenotime is non-radioactive and thus, should be chemically processed locally and use in local downstream industries. Two of those minerals have been identified:

1) Non-radioactive rare earth elements (NR-REE) in Mukim Kenering, Gerik².

2) Limestone in Simpang Pulau, Mukim Sungai Raia.

The total estimated NR-REE deposits are 1,687,500 tonnes in Hulu Perak.² HREE are highly-sought for its uses in technological applications from smartphones, tablets, computer monitors and plasma televisions to rechargeable batteries and magnetic resonance imaging machines. However, investors must be selected among those that are capable of mining and quarrying the high-quality minerals AND creating their upstream potential. To attract global industry players, the industrial areas must be enhanced by improving the attractiveness and investments in these areas (under Strategy D Priority Area of the 12MP).

Activities, Timeline and Cost Estimation

Activities	Period	Cost	Lead Agency
Establish the NR-REE industrial area for SRM and upstream industries on 578.957 hectares land in Mukim Kenering, Gerik, 5 companies @100hectares/lot ⁴	Sept 2022 - Mar 2023	MB Inc lands (RM12.5 mill/lot @RM50/acre)	ENR (MBInc)
Establish an industrial area for SRM of Limestone and its upstream industries at Simpang Pulau, Sungai Raia. 100ac/lot ^{5,6}	Sept 2022 – Dec 2023	PPPNP lands (land price RM1,437,500 per acre x 100 acres ⁵)	ENR and PPPNP
Improve attractiveness of the industrial areas to attract investments - upgrade infrastructure and facilities, and improve livelihood of the nearby areas.	Jan 2023 – Dec 2023	RM10 million	ENR, PPPNP, Local authorities
	Total	RM10 mil	

Footnotes:

1. <https://www.businesstoday.com.my/2022/06/10/environment-watchdog-clamours-for-rare-earth-mining-proposal-details-in-hulu-perak/> - the mining plot is in 1,430.634 acres (578.957 hectares) forests in Hulu Perak owned by MBI Perak. This area is on top of a total of 3,907.882 acres (1,581.438 hectares) also allocated for rare-earth mining in the northern Perak district.
2. Be mindful in handling out rare earth licences, Perak ruler tells state govt. 25 August 2021. <https://www.thevibes.com/articles/news/39435/be-mindful-in-handling-out-rare-earth-licences-Perak-ruler-tells-state-govt>
3. The Blueprint for Rare Earth-Based Industries in Malaysia.
4. Lynas established its plants on 100ha areas at Gebeng and within close proximity with the Kuantan deep water port. <https://lynasrareearths.com/about-us/locations/kuantan-malaysia/>; and price of land at Pengkalan Hulu ~RM1.19/sqft at <https://www.propertyguru.com.my/agricultural-land-for-sale/in-hulu-perak-pr021>
5. GCCP Gridland Quarry operates on 80 acres land in Smpg Pulau and Industrial land price at Simpang Pulau RM1,437,500/acre from <https://www.iproperty.com.my/sale/perak/industrial-land/>
6. White limestone (calcium carbonate) is used in whiten paper, in paints as a bond, in plastics as a filler and an alternative to oil based resins and a multitude of other uses which include latex gloves, skin whitening and toothpaste. <http://www.ipohecho.com.my/v2/2013/08/16/ipoh-limestone-an-environmental-management-challenge/>

Sources:

7. MB announcement, April 18 2022, <https://www.malaysiakini.com/news/618387>
8. <https://malaysiagazette.com/2022/04/15/projek-perlombongan-nr-ree-di-hulu-perak/>
9. <https://foe-malaysia.org/articles/do-not-allow-proposed-mining-of-lanthanide-in-mukim-kenering-hulu-perak/>
10. The 15 elements in Lanthanide are lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd), promethium (Pm), samarium (Sm), europium (Eu), gadolinium (Gd), terbium (Tb), dysprosium (Dy), holmium (Ho), erbium (Er), thulium (Tm), ytterbium (Yb), and lutetium (Lu) Notes:
11. PPPNP - Perbadanan Pembangunan Pertanian Negeri Perak (PPPNP) is the land owner
Perak JMG director says lanthanide found in Hulu Perak is a non-radioactive rare earth element
-<https://www.malaymail.com/news/malaysia/2022/05/25/perak-jmg-director-says-lanthanide-found-in-hulu-perak-is-a-non-radioactive-rare-earth-element/8763>

Expected Output:

- Increase revenue to the State (on 100ha site, Lynas can produce 22,000 tonnes per annum. On 80 acres site, GCCP Gridland Quarry produce 300,000 tonnes per annum).
 - Increase in the number of jobs (eg., Lynas hires 600 local workers).
-

Intervention Program 4:

Upgrade land connection from remote/rural areas with SRM & upstream industry potential (extend from Pengkalan Hulu through Kenering, Gerik and Sungai Raia) to Lumut Port

Objective:

To improve transport infrastructure and ICT interconnectivity

Justification:

Land and sea transportations are the basic infrastructures for mineral-based industries since their materials and products are bulky and heavy, and the trade involves international partners. Consistent with Policy Enabler #3 of the 12MP, Perak needs to upgrade the road infrastructure in remote areas with potential in mineral-based industries: Pengkalan Hulu and Gerik to better attract local and global investors into the areas, and facilitate exports of the productions. The program can be funded with allocation for a program such as Initiative 1: Development Projects for Recovery #230 of the Budget2022, which allocated RM2.9 billion, among others, for road maintenance projects. The projects are under the supervision of the Public Private Partnership Unit (PPPU), Prime Minister's Office. The routes in question are:

- Pengkalan Hulu through MBIP-Kenering, Gerik and (266km to LMT vs 125km (from Kenering) to Penang Port)
- MBIP- Simpang Pulai, Sungai Raia (80km to LMT vs 158km to Penang Port)

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Conduct surveyor works to determine areas that require upgrades within the 300km stretches from Pengkalan Hulu and Gerik to Lumut Port and Simpang Pulai to Lumut Port	Jan - Apr 2023	RM1 mill	JKR dan PEJUTA
Upgrade the road stretches between (estimated 10% of 300km – Appendix A, @RM1mill/km considering upgrade type)	Apr 2023 – May 2024	RM30 mill	JKR, PPPU and UPEN
	Total	RM31 mill	

Notes: COI = Centre of Investment, Perak. PPPU = Public Private Partnership Unit (PPPU), Prime Minister's Office, PEJUTA = Persatuan Juruukur Tanah Bertauliah Malaysia

Expected Output:

- Increase the number of global industry players to process minerals extracted from these MBIPs at their midstream and downstream plants in LuMIC4.
- Increase revenue from LMT and tax on those companies (reduce leakage to other states)
- Increase number of jobs locally and economic spillover to nearby areas

Intervention Program 5:

Empower Lumut Maritime Terminal Sdn Bhd (LMT) to accelerate the elevation and expansion of Lumut Port System with LMT 2 and LMT 3 to accommodate increases in international vessels

Objective:

To improve transport infrastructure and ICT interconnectivity

Justification:

Land and sea transportations are the basic requirement for mineral-based industries since their materials and products are bulky and heavy and the trade involves international partners. With other major ports (Klang and Penang) are approaching capacities, Perak should promote Lumut Ports since this is infrastructure support required to attract more quality investment in heavy industries. Consistent with Policy Enabler #3 of the 12MP, Perak should optimize its Lumut Port to better attract local and global investors (refer to Table 3.9 at the end of this document). The State might consider a program similar to Development Projects for Recovery #230 (Budget2022) which provides RM200 million allocation to boost high-impact infrastructure development activities. The existing Lumut Port is operated by Lumut Maritime Port Sdn Bhd (LMT). To embark on an extensive plan (LMT to 3 and 5 LuMICs), LMT may need consider partnership with other players such as Malaysia Mining Corporation (MMC Group), which is the major owner of many major ports in Malaysia. However, given its strength in mineral mining, Perak is in a good position to involve MMC Group in this partnership. The project can be placed under the supervision of the Public-Private Partnership Unit (PPPU), Prime Minister's Office.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Promote Lumut Port as the bulky-cargo handler worldwide	Jun - July 2022	RM100 K	COI
Initiate G2B discussions to identify companies interested to invest in the project eg., MMC)	Jun - July 2022	RM100 K	Lumut Port & COI
Implement the private-public upgradation projects for more efficient Lumut Port System by adopting I4.0tech and processes	Jan 2023 - Dec 2024	RM10 mill	PPPU and Lumut Port
	Total	RM1.2mill	

Expected Output:

- Increase in the number of fleets to facilitate mineral-based materials and products trade via sea transport infrastructure
- Increase efficiency by offering digitalized logistics (warehouse and transshipment) services

Source: South China Post (<https://www.scmp.com/country-reports/country-reports/topics/malaysia-business-report-2020/article/3052630/lumut-port>)

Intervention Program 6:

Improve internet access in industrial areas to facilitate remote working in the new normal and adoption of Industry 4.0 technologies.

Objective:

To improve transport infrastructure and ICT connectivity.

Justification:

Fast and secure data connection is a basic requirement for the adoption of Industry 4.0 technologies, and attracting global industry players. Malaysia has already deployed High-Speed Broadband (HSBB) and 5G technologies on a widespread basis. However, the statistics for Perak (MCMC, 2021) showed that premises in the state has very low (<40%) broadband internet access and most likely on 4G, which may not support the adoption and development of Industry 4.0 technologies and processes. Perak can take advantage of Digital Nasional Berhad (DNB) under 12MP that is established to accelerate the provision of 5G coverage. The project can also enhance the attractiveness of the industrial areas, to bring more investments (Strategy D Priority Area of the 12MP). Based on Perak's JENDELA plan, there are excess allocations of 90,979 premises in Perak that will be equipped with fibre optic. This intervention program aims to systematically address and remove key connectivity bottlenecks in priority locations and eliminate disruption in ICT connectivity needed for the globalized working environment in the pandemic and its aftermath.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify key industrial areas housing high-tech downstream product manufacturers (eg., more will be needed in Lumut (5G) and Pengkalan Hulu (no allocation for PH in the existing plan))	Jun - July 2022	RM100 K	MCMC
Implement HSBB and 5G at the industrial areas	July - Sept 2022	RM1 mill	MCMC
Encourage the deployment of converged networks that are essential for Industry 4.0 technologies in selected IPs	July - Sept 2022	RM100 K	Digital Perak
	Total	RM1.2mill	

Expected Output:

- Increase in the number of industrial parks with 5G-HSBB facilities.
- Increase in the number of tenancies in upgraded industrial parks and districts.

Source: Pembangunan Digital Di Negeri Perak Oleh Kementerian Komunikasi Dan Multimedia (https://rmke12.epu.gov.my/storage/fileUpload/2021/11/2021111822_slaid_slu_perak_kkmm.pdf)

Intervention Program 7:

Attract high-skilled, high-tech talents back to Perak to support the development of downstream product industries

Objective:

To increase GDP per capita via the creation of high-tech skilled job opportunities in the mineral-based industry

Justification:

In line with the National Fourth Industrial Revolution (4IR) Policy and the Malaysia Digital Economy Blueprint, Malaysia plans to build its economic resiliency and competitiveness by leveraging advanced technology adoption, digitalization, and niche capabilities. Although the mineral-based industry is not classified as the strategic and high-impact industry in the 12MP, it has been the main contributor to the economy's GDP. The report cited the survey results of Boston Consulting Group (BCG) in 2015, 1.2 mill industrial robots are expected to be deployed by 2025, thus indicating rise in automation and robotics technology adoption to improve productivity and reduce production costs. According to KPMG report, 16% executives of global metals companies have already invested in robotics for metal manufacturing, 31% executives have set plans to possibly invest in robotics for new technology and opportunities, and 42% are willing to invest on robotics in the near future. Additionally, the report states, 63% of the executives of metal manufacturing companies are considering investing in automation. Therefore, Perak needs to keep abreast with the transformation since global industry players have been leveraging on the Industry 4.0 technologies. The State should also offer factors that attract migration, i.e., comfortable area and environment that offer safety and affordability relative to metropolitan cities.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Create special sponsorships and education loans for young talents pursuing programs in Industry 4.0 technologies, local and abroad*	Sept 2022, then yearly	RM5 mill	Perak State Govt
Empower PASAK to better promote high-tech skilled employment opportunities by holding job fairs outside Perak	2023 onward, yearly	RM100,000	PASAK, EHEHRC & MARA
Introduce a "live, leisure and learn" campaign encouraging land and property developers to create a living environment that is attractive to migration to Perak	Sept 2022 onward	RM100,000	UPEN
	Total	RM5.2 mill	

Nota: PASAK = Pusat Aspirasi Anak Perak, EHEHRC = Education, Higher Education, and Human Resource Committee. Perak's GDP per capita needs to increase by 6% per annum to reach a high-income state status (threshold GDP per capita = RM50,140). Growth rate 1.14% is based on 19.1% manufacturing contribution to Perak's GDP (DOSM: Economic structure by state and sector 2020). *Allocation in addition to existing allocation of about RM10 mill per year.

Expected Output:

- Increase in the number of high-tech skilled talents in Perak

-
- Increase GDP per capita to high-income state status (E(2020) = RM31,486 vs RM50140 high-income status).
-

Intervention Program 8:

Encourage recruitment of high-tech skilled talents from global industry players and foreign countries.

Objective:

To increase GDP per capita via the creation of high-tech skilled job opportunities in the mineral-based industry

Justification:

Perak has been facing a brain drain but shortage of high-tech skilled workers is a problem across the globe. Developing a pool of high-tech skilled workers is necessary but will take time. Therefore, to build its economic resiliency and competitiveness by leveraging advanced technology adoption, digitalisation and niche capabilities, the State needs global industry players to transfer of technology and knowledge from their own talents to the local workforce. To cater the needs of high-tech global companies, Perak may need encourage recruitment of expatriates from countries producing low-cost high-tech skilled employees like India. Future high-tech skilled talents need to be cultivated by increasing high-tech courses in the respective TVET colleges.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify key high-tech skills needed by the high-tech global industry players	Jun - July 2022	RM100 K	MCMC
Introduce incentives (such as tax reliefs) for high-tech global industry players to set up their facilities in Perak	July - Sept 2022	RM1mill	MCMC
Introduce incentives (such as tax reliefs) for high-tech skilled expatriate recruitments	July - Sept 2022	RM100 K	Digital Perak
	Jumlah	RM1.2mill	

Expected Output:

- Increase in the number of high-tech skilled talents in Perak
 - Facilitate technology transfer to local companies and talents
 - Increase GDP per capita to high-income state status (E(2020) = RM31,486 vs RM50140 high-income status).
-

Intervention Program 9:

Provide (tax) incentives for companies to train workers with digital technologies to improve productivity

Objective:

To increase GDP per capita via the creation of high-tech skilled job opportunities in the mineral-based industry

Justification:

Malaysia is set to build its economic resiliency and competitiveness by leveraging advanced technology adoption, digitalisation and niche capabilities. Although mineral-based industry is not classified as strategic and high-impact industries in the 12MP, it has been the main contributor to the economy's GDP. The global industry players have been leveraging on the Industry 4.0 technologies. For instance; BASF SE, one of the top 5 global basic metal companies use digital technologies and data to create additional value for our customers and increasing the efficiency and effectiveness of our processes. Manufacturers of non-metallic mineral products adopt AI to reduce equipment downtime, spot production defects, improve supply chains, and shorten design timelines. Under 12MP's Strategy B1: Enhancing Supply Chain Sustainability, Malaysian companies are encouraged to increase cooperation with foreign companies to facilitate the transfer of technology and knowledge, and develop a skilled domestic workforce.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify key industrial areas and training centres – special attention on Batu Gajah - Lumut - Gerik	Jun - July 2022	RM100 K	MCMC
Implementation of HSBB at the key industrial areas and training centers	July - Sept 2022	RM1mill	FMM and HRDF
Introduce incentives (eg., tax relief) for employers to implement compulsory training in Industry 4.0 technologies (eg., 80 hrs/year)	2024 onward, yearly	RM1 mill in incentives	ADTEC, FMM & HRD Corp
	Jumlah	RM1.2mill	

Expected Output:

- Increase attractiveness of Perak relatives to neighbouring states
- Priority to I4.0 technology adopters

Source: MyDIGITAL (2021) - Artificial Intelligence (AI) technology can increase GDP by up to 26% in the next decade

3.4 Halal & Bio-Technology Cluster

3.4.1 Vision

To position Perak towards becoming one of the leading and strategic global halal and bio-technology hub.

3.4.2 Objective

- To achieve 11% of GDP contribution for halal industry with the main focus on food manufacturing;
- To develop halal and bio-technology ecosystem and infrastructure.

3.4.3 Strategy

- Enabling the development of halal and bio-technology ecosystem and infrastructure;
- Increase the level of productivity to ensure food security and self-sufficiency and enhance the quality of food manufacturing and processes through bio-technology application;
- Upskilling existing talent and develop future talents.

3.4.4 Focused Intervention Programs

The focused intervention program encompasses the development in the ecosystem and infrastructure of halal and bio-technology with a specific focus on food manufacturing and processes. The intervention will require an ecosystem that optimizes the relationships among people, processes and technology. The following intervention programs aims to support the above vision, objectives and strategies.

Strategy	Intervention Program
Enabling the development of halal and bio-technology ecosystem and infrastructure	<ol style="list-style-type: none"> 1. Create conducive environment including infrastructure capacity and capabilities, financial packages, supportive legislations and regulations framework, and Government-backed policies and initiatives 2. Establish digitalized Halal & Bio-Tech hub to create a digital platform and intensify the opportunity of halal and bio-technology global market demand through entrepreneurship programs and activities especially for the SMEs to assess and access market potentials and global demand 3. Establish Halal Park with the elements of bio-technology peripheral
Increase the level of productivity to ensure food security and self-sufficiency and enhance the quality of food manufacturing and processes through bio-technology application	<ol style="list-style-type: none"> 4. Establish research and development collaborations including innovation and commercialisation initiatives through Public Private Partnership (PPP) 5. Enhance food security and create new marketable products to promote diversification 6. Implementation of good practices for manufacturing and business processes to support halal and bio-technology industry
Upskilling existing and develop future talents	<ol style="list-style-type: none"> 7. Enhance capabilities of workforce through national development programs designed for halal and bio-technology manufacturing sectors 8. Ensure the availability of future talent by equipping students with the necessary skillsets 9. Promote franchise type of business in Halal and bio-technology including mentoring opportunities.

Intervention Program 1:

Create conducive environment including infrastructure capacity and capabilities, financial packages, supportive legislations and regulations framework, and Government-backed policies and initiatives

Objective:

To attract Halal and bio-technology manufactures and investors to Perak.

Justification:

It is important to create opportunities for investments, trade, employment, information sharing and technology transfer within the halal and bio-technology ecosystem and international trade collaborations. We need a world class infrastructure, skilled and productive workforce, ease of doing business, accessibility to halal sourced ingredients and attractive government incentive that encourage investment. Therefore, conducive environment including infrastructure capacity and capabilities, financial packages supportive legislations and regulations framework, and Government-backed policies and initiatives should be the major focus to boost the industry which should also be investor friendly. Quick and transparent processing and approval of applications would be the priority aspect in terms of land approval and licensing.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Review and revise current state policies and incentives on Halal and Bio-Technology.	Jun - Sept 2022	RM20K	Invest Perak
Introduction and implementation of new state policies and incentives on Halal and bio-technology and trade financial packages.	Oct - Dec 2023	RM1M	Invest Perak
Awareness programs on the policies and legislations including opportunities and incentives	Jun 2022– Dec 2023	RM150K	Invest Perak
Set up of Yayasan Halal Perak to offer macro credit or financial assistance to SMEs	Jun-Oct 2022	RM100M	Perak Corp
	Total	RM101.17M	

Expected Output:

- Creation of new halal and bio-technology policies and incentives for Perak
 - Increase in the numbers of halal and bio-technology manufacturers and investors
-

Intervention Program 2:

Establish Halal Park with the elements of bio-technology peripheral

Objective:

To attract Halal and bio-technology manufactures and investors to Perak.

Justification:

Halal Park is an initiative by HDC of Malaysia. HDC awarded HALMAS accreditation to halal park operators that have complied with the requirements stipulated under the HDC-designated halal park development. With the HALMAS status, industry players and investors will be able to enjoy incentives facilitated by HDC. Perak Halal Park is projected to be located at Alor Pongsu but yet to be materialised. There is also one established Halal Park in Tambun, Perak under the management of MARA. As for bio-technology particularly the smart agriculture technology, it is most appropriate to utilize the set-up of Perak Silver Valley Technology Park (SVTP). In order to succeed the objective of Halal Park establishment, the overall ecosystem of Halal Park should be prepared thoroughly. It is not only about buying and selling of land and development of buildings but the support system as well as the management and maintenance aspects.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify businesses that are viable to join Halal Park @ Alor Pongsu	Jun - Dec 2022	RM100K	Perak Halal Corp
Identify businesses that are viable to join SVTP	Jun - Dec 2022	RM500K	NCER
Promotions of Halal Park and SVTP	July 2022 - Dec 2030	RM500K	Perak Halal Corp
	Total	RM1.1M	

Expected Output:

- Increase in the numbers of businesses that join halal park and SVTP
-

Intervention Program 3:

Establish digitalized Halal & Bio-Tech hub to create a digital platform and intensify the opportunity of halal and bio-technology global market demand through entrepreneurship programs and activities especially for the SMEs to assess and access market potentials and global demand.

Objective:

To optimize the potentials of SMEs to assess and access market potentials and global demand

Justification:

Digital platform will help to build the right technological capabilities which will aid firms in minimizing risk, ensuring the right processes and procedures and maximizing efficiency. In this context, Halal Development Corporation Bhd (HDC) has developed a framework under the Halal Industry Master Plan 2030 for the development of Halal industry in Malaysia which Perak should actively participate particularly with the formation of Halal Integrated Platform (HIP) to help entrepreneurs venture into new potential business opportunities in order to gain domestic and international market access. This platform will act as a bridge between entrepreneurs and industry stakeholders under a single Halal ecosystem. HDC had also initiated the Global Data Halal Pool (GDHP) which is a halal data pool to connect Malaysia with the international halal supply chain. GDHP brings together and connect accredited halal suppliers, manufacturers, product service providers, buyers and retailers in the global marketplace. The use of blockchain technology should be also considered and explored in halal supply chain to ensure food integrity and traceability.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify capable ventures of Halal and Bio-Technology Digital Platform	June - Aug 2022	RM250K	Perak Halal Corp
Gather the existing and potential data of entrepreneurs and industry stake holders	Sept 2022-Mar 2023	RM100K	Perak Halal Corp
Organise Halal and Bio-Technology international expo and forum	June – Dec 2022	RM150K	Invest Perak
	Total	RM500K	

Expected Output:

- Increase in the numbers of entrepreneurs and investors in Halal and Bio-Technology
-

Intervention Program 4:

Establish research and development collaborations including innovation and commercialisation initiatives through Public Private Partnership (PPP)

Objective:

To increase collaborations among research institutions and private participation

Justification:

Research and development (R&D) play an essential role in conducting research and development of new techniques applying bio-technology as well as to ensure the authentication and safety of products. Therefore, it is pertinent to enhance collaborations in R&D among research institutes in product development and improvements, and assisting SMEs involved, in acquiring the necessary technological capabilities to upgrade their manufacturing processes, as well as enhance product development and improvements to commercialise findings. Among possible strategic collaboration is with the higher education institutions, be it local or abroad and also international council such as Halal Research Council which is an organization working globally on Halal certifications in order to cater the needs of food and nutrition agencies and side by side non-food agencies especially in the FMCG sectors. PPP on the other hand will support R&D in terms of expertise, research facilities and financial assistance.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify R&D institutions and private sectors to collaborate	Jun - August 2022	RM100K	Perak Corp
Implementation of R&D collaborations	Sept – Dec 2030	RM15M	Perak Corp
	Total	RM15.1M	

Expected Output:

- Increase in the numbers of collaborations for R&D
 - Increase in the numbers of new products for commercialisation
-

Intervention Program 5:

Enhance food security and create new marketable products to promote diversification

Objective:

To increase self-sufficiency and productivity in the food manufacturing sector by 30% and create new produce using bio-technology

Justification:

The Food and Agriculture Organization of the United Nations (FAO), identified four pillars of food security as availability, access, utilization, and stability. It is estimated that the demand for food will rise by 70 to 100 percent by 2050. To meet this need, the United Nations estimates that production in developing countries will need to almost double. New technology through bio-technology could elevate and increase food production via smart agriculture and agricultural bio-technology. Agricultural biotechnology is rapidly advancing and is providing a number of tools to improve crop production that is important to feed the global population. The global scientific community is already advancing from conventional breeding techniques and genetic engineering to more precise technologies such as gene editing. This could also spurn a new produce by way of bio-technology. Product diversification allows for more variety and options. For example, one fruit that has been of choice as quick energy is banana. Banana has many benefits including high in vitamin C, manganese in banana is good for our skin while potassium in banana is good for our heart health and blood pressure. Banana can also aid digestion and help beat gastrointestinal issues. Nowadays with the use of technology, banana flavour could be enhanced and methods of producing new gene should be explored due to the high demand of the fruit. Due to its price, banana could generate as high income gain as some spectacular banana like the blue banana can cost between RM100 to RM 1000 per kg. Other than the increase of agriculture produce, strategy to avoid food waste by waste management could also help the environment. In terms of Halal prospects, Perak has been allocated RM5M by the Ministry of Finance to prosper Halal meat projects. The Perak State Agriculture Corporation (PPPNP) has signed a memorandum of understanding (MoU) with RISDA Livestock Sdn Bhd (RLSB) and Perak Farmers Organisation (PPN/LPP) to develop the Halal Meat Hub Development Project which is also a continuation of PPPNP's efforts via its subsidiary, Eurofresh Sdn Bhd, to explore new markets involving the distribution, supply and local meat business as well as frozen products, including imported meat.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify and optimise land area for agriculture activities	Jun - Oct 2022	RM500K	Perak Department of Agriculture
Identify new potential high income produce	Jun - Oct 2022	RM200K	Perak Department of Agriculture
Conduct R&D using bio-technology and follow halal processes and halal requirements	Nov 2022- Dec 2025	RM1M	MARDI
	Total	RM1.7M	

Expected Output:

- Increase self-sufficiency and production of new high income produce
-

Intervention Program 6:

Implement good practices for manufacturing and business processes to support halal and bio-technology industry

Objective:

To increase the number of registered halal manufacturers and bio-technology business related entity

Justification:

Revenue for halal certification for Perak in 2020 was RM301,900 marked above the estimated figure of RM200,000. Accordingly, Malaysia is the leading country in halal ranking followed by UAE. As such, Perak should grab this opportunity to develop and advance halal and bio-technology. Particularly, manufacturers must adhere to strict regulations in addition to achieving certain levels of certification. Apart from Halal certification, the rules and standards such as the Hazard Analysis And Critical Point (HAACP) and Good Manufacturing Practices (GMP) were established to regulate product registration.

In this context, Malaysia halal certification scheme is divided into:

- Food Product/ Beverages/ Food Supplement
- Food Premise/ Hotel.
- Consumer Goods, Cosmetic and Personal Care
- Slaughterhouse
- Pharmaceutical; and Logistic.

Therefore, there is a vast potential for the industry to grow and expand.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify businesses for registration and facilitate by promotion and awareness programs	Jun - Oct 2022	RM50K	Perak Halal Corp
	Total	RM50K	

Expected Output:

- Increase in the numbers of registered business entity thus increase revenue for licences and certifications.
-

Intervention Program 7:

Enhance capabilities of workforce through national development programs designed for halal and bio-technology manufacturing sectors.

Objective:

To increase the number of programs related to the development and talent management in the halal and bio-technology industry

Justification:

Halal training faced many issues, such as various different types of training programs and lack of structured training programs. Based on an interview conducted on the 8th April 2022 with a Halal Consultant, Encik Ahmad Shaiful Alwi Md Noor, Managing Director of Novavita Sdn Bhd that there is a need for a structured training including specific coaching by looking at the niche and strength of individual business entity. Skilled workforce requires training designed for its specific purpose. For example, the need for Halal Assurance System Personnel who is in-charge for a systematic approach to identify non-halal contamination and control measures to ensure halal and safety status of products and services. Halal training must accommodate specialisation rather than generality on the type of products and services as suggested by Encik Ahmad Shaiful. Other than the issue of lack of structured and specific training, the high turnover rate also creates issues and challenges for Halal industry. It means that firms must allocate costs for training a new hire. Firms also need to provide objective, fair and transference performance appraisal to motivate employees, therefore managing performance management is crucial for employee performance.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify specific area for training in halal and bio-technology programs	Jun - Dec 2022	RM100K	Perak Halal Corp
Implementation of relevant and specific training for skilled workers	Feb 2023 - Jan 2030	RM500K	Perak Halal Corp
	Total	RM600K	

Expected Output:

- Increase in the numbers of workforce in the halal and bio-technology industry.
-

Intervention Program 8:

Ensure the availability of future talent by equipping students with the necessary skillsets.

Objective:

To increase the number of workforce in the halal and bio-technology industry.

Justification:

Future skills are competences that allow individuals to solve complex problems in highly emergent contexts of action in a self-organised way and enable them to act successfully based on cognitive, motivational, volitional and social resources which are value-based and can be acquired in a learning process. Scientific knowledge is creating new opportunities and solutions while at the same time fuelling disruptive waves of change in every sector. Unprecedented innovation in science and technology, especially in bio-technology and artificial intelligence, is creating new economic, social and institutional models. The rapid advance of science and technology must be steered with a clear purpose and strategic planning through consistent learning and education process. According to the Organisation for Economic Co-operation and Development (OECD) (2018), students must be prepared for the future and they need a broad set of knowledge, skills, attitudes and values in action. In this regards, Perak through Universiti Sultan Azlan Shah (USAS) should take this opportunity to provide for more designed and specific courses in the halal and bio-technology area. Universiti Teknologi Petronas (UTP) could also play a role to offer courses to cater for smart agriculture via its engineering courses. Collaboration with industry players should also be explored for example the Recognition of Prior Achievement (PPT)–Malaysian Skills Certificate (SKM) (PPT-SKM) by the Faculty of Pharmacy, Universiti Teknologi MARA (UiTM) and the Department of Skills Development (JPK) under the Ministry of Human Resources to recognise professional careers and certify individuals with expertise in certain fields.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify specific area for training in halal and bio-technology programs	Jun - Dec 2022	RM100K	Universiti Sultan Azlan Shah (USAS/IPTS)
Implementation of relevant courses	Feb 2023 - Jan 2030	RM500K	USAS/UTP
	Total	RM600K	

Expected Output:

- Increase numbers of workforce in the halal and bio-technology industry.
-

Intervention Program 9:

Promote franchise type of business relating to Halal and bio-technology industry including mentoring opportunities.

Objective:

To increase the number of businesses and diversify the type of businesses in halal and bio-technology industry

Justification:

Alternative type of business that could create better prospect and potential be it local or global should be explored. For example, a franchise is a business whereby the owner licenses its operations along with its products, branding, and knowledge, in exchange for a franchise fee. The franchisor is the business that grants licenses to franchisees. The Franchise Development Division under the Ministry of Domestic Trade and Consumer Affairs is the governing body for franchising laws and regulations. Some of the most successful and international franchise businesses include Subway, McDonald's, Pizza Hut, Burger King and Dunkin' Donuts. In this context, the venture of halal franchise businesses could foster the global halal market demand with potential and opportunities to entrepreneurs. This could also include mentoring opportunities among new businesses. It is proposed that franchising businesses of SMEs is assisted by the SME Corp together with the Malaysian Franchise Association. Accordingly, under SME Corp, all SMEs must be entities registered with SSM or other equivalent bodies but excludes:

- Entities that are public-listed on the main board; and
- Subsidiaries of:
 - Publicly-listed companies on the main board;
 - Multinational corporations (MNCs);
 - Government-linked companies (GLCs);
 - Syarikat Menteri Kewangan Diperbadankan (MKDs); and
 - State-owned enterprises

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify potential entrepreneurs to join halal and bio-technology franchise business	Jun - Dec 2022	RM100K	SME Corp (Perak)
Provide opportunity for franchise business among entrepreneurs particularly SMEs	Feb 2023 - Jan 2030	RM500K	Perak Halal Corp
	Total	RM600K	

Expected Output:

- Increase in the numbers of franchise business in the halal and bio-technology industry.
-

3.5 Manufacturing Related Services - Digital Economy Cluster

3.5.1 Vision

To transform the manufacturing industry by embracing Industry 4.0 technologies which drive Perak towards greater competitiveness.

3.5.2 Objective

- To increase the level of productivity in the manufacturing sector by 30%;
- To improve both manufacturing and business processes to support digital transformation ;
- To foster a seamless and accelerated adoption of industry 4.0 technologies especially for SMEs.

3.5.3 Strategy

- Enabling ecosystem and efficient digital infrastructure;
- Increase awareness of the need and benefits of IR4.0 technologies and processes esp to SMEs;
- Upskill existing talents and produce future talents.

3.5.4 Focused Intervention Programs

The focused intervention program encompasses the digital transformation in manufacturing industry with a specific focus on the adoption of Industry 4.0 technology. The transformation will require an approach and an ecosystem that optimise the relationships among people, process and technology. Industry 4.0 adoption will only be as good as the processes that are implemented around it, and the processes are only as good as the people who execute them. The following intervention programs aims to support the above vision, objectives and strategies.

Strategy	Intervention Program
Enable ecosystem and efficient digital infrastructure	<ol style="list-style-type: none"> 1. Strengthen the digital connectivity in and between industrial, education and training hubs to remove connectivity bottlenecks in adopting industry 4.0 2. Enhance the digitalisation and integration of Government processes and infrastructure along supply and manufacturing value chains 3. Connecting service providers for Industry 4.0 to manufacturing firms to help implement technologies, processes and skills development
Increase awareness of the need and benefits of IR4.0 technologies and processes esp to SMEs	<ol style="list-style-type: none"> 4. Create a platform and mechanism to help manufacturing and related services firms especially the SMEs to, assess and develop their Industry 4.0 capabilities 5. Establish digital/technology labs to create awareness and understanding, foster adoption of new technology and facilitate the transfer of knowledge 6. Intensify research, innovation and commercialisation and entrepreneurship programs and activities in Industry 4.0 technologies and processes
Upskill existing talents and produce future talents	<ol style="list-style-type: none"> 7. Enhance capabilities of existing workforce through national development programs design for specific manufacturing sectors 8. Ensure the availability of future talent by equipping students with the necessary skillsets to work in the industry 4.0 environment. 9. Introduce dynamic and innovative financial products to encourage the adoption of Industry 4.0 technologies & processes

Intervention Program 1:

Strengthen the digital connectivity in and between industrial, education and training hubs to remove connectivity bottlenecks in adopting industry 4.0.

Objective:

To increase the level of productivity in the manufacturing sector by 30%

Justification:

Fast and secure data connection is a basic requirement for the realisation of Industry 4.0 technologies and services. Malaysia has already deployed High Speed Broadband (HSBB) and 4G technologies on a widespread basis. Perak should take advantage of deploying the HSBB and 4G technologies. However, there are some gaps in key industrial and training locations that could impact the adoption and development of Industry 4.0 technologies and processes. This strategy aims to systematically address and remove key connectivity bottlenecks in priority locations.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify key industrial areas and training centers	Jun - July 2022	RM100 K	MCMC
Implementation of HSBB at the key industrial areas and training centers	July - Sept 2022	RM1mill	MCMC
Encourage the deployment of converged networks that are essential for Industry 4.0 technologies	July - Sept 2022	RM100 K	Digital Perak
	Jumlah	RM1.2mill	

Expected Output:

- Increase in the numbers of high speed, reliable and affordable connectivity for industrial, education and training hubs
- Increase in the numbers of digital and Industry 4.0 technologies and processes among manufacturing firms and related services providers

Intervention Program 2:

Enhance the digitalisation and integration of Government processes and infrastructure along the supply and manufacturing value chains

Objective:

To increase the level of productivity in the manufacturing sector by 30%

Justification:

A digitalised and connected infrastructure across supply and manufacturing value chains is critical to foster a seamless movement of goods, data and services; drive efficiency and resource optimisation and support joint development efforts. Currently, a number of processes are not digitalised across many ministries and Government agencies, ranging from various approvals, licensing, certification, to clearance of goods and other processes. Digitalising and integrating Government processes and infrastructure elements along value chains will be key to enable secure data flow, assure seamless movement of goods, and drive improvements in efficiency and productivity. The Government processes that are not yet digitalised will need to be optimised, digitalised and integrated to support Perak's Industry 4.0 transformation. These include certain approvals, licensing, certification, clearance of goods and other processes.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify key processes and infrastructure elements along manufacturing and supply value chains	Jun - July 2022	RM100 K	Digital Perak
Improve visibility for seamless movement or processes of goods and services among manufacturers, suppliers and supporting agencies with optimised resourcing.	July 2022 - Jan 2023	RM500k	Digital Perak
Assess priority Government-related processes and elements that impact manufacturing and supply chains and Industry 4.0 transformation.	Feb - Sept 2023	RM500k	Digital Perak
Build end-to-end digitalisation of Government processes along the manufacturing and supply value chains.	Oct 2023 - Sept 2024	RM100 mill	Digital Perak
Provide support for the accelerated digitalisation and integration of these processes.	Oct 2024 - Sept 2025	RM500k	Digital Perak
	Jumlah	RM101.6 mill	

Expected Output:

- Increase in the level of productivity of manufacturing companies
- Increase in the the efficiency of approvals, licensing, certification, clearance of goods and other processes.

Intervention Program 3:

Connecting service providers for Industry 4.0 to manufacturing firms to help implement technologies, processes and skills development

Objective:

To improve both manufacturing and business processes to support digital transformation

Justification:

Service providers will play an essential role in helping Perak's companies to accelerate their transition to Industry 4.0, particularly in developing people, transforming processes and adopting technologies. As such, involving service providers and connecting them to manufacturing firms, especially SMEs, is important to create a holistic and effective Industry 4.0 ecosystem. Services related to Industry 4.0 are important to help Malaysian companies accelerate their transition. The Industry 4.0 service providers need to be involved as an integral part of the ecosystem and be connected to manufacturing firms, especially SMEs, who often have limited visibility.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Develop and disseminate a database of service providers	Jun 2022 - July 2023	RM500 K	SME Corp
Link service providers to manufacturing firm and SMEs through collaboration platforms	July 2023 - Sept 2024	RM500 K	SME Corp
Provide support on digital adoption within the manufacturing value chain with a structured approach and measurable outcomes	Oct 2024 - Sept 2030	RM500 K	Digital Perak
	Jumlah	RM1.5 mill	

Expected Output:

- Improve end-to-end support and service providers visibility for manufacturing firms
 - Increase the number of local or Global Business Services (GBS) providers relocate to Perak in order to provide services to manufacturing firms
-

Intervention Program 4:

Create a platform and mechanism to help manufacturing and related services firms especially the SMEs to assess and develop their Industry 4.0 capabilities

Objective:

To foster a seamless and accelerated adoption of industry 4.0 technologies especially for SMEs.

Justification:

Lack of awareness in digitalisation and Industry 4.0 is one of the main barriers to embark on smart manufacturing transformation. A greater understanding of Industry 4.0 is crucial for manufacturing firms to make informed decisions on investments, especially on assessing impact, determining costs and benefits of automation, and capitalising on data. Structured awareness programmes are needed to educate and promote the understanding and need for action to local firms, particularly SMEs. In addition, for many companies, Industry 4.0 will be a major transformation, not only in terms of investment in technologies but also changes in business processes and culture. The assessment tools and platforms for learning and sharing of best practices help companies, especially SMEs, pinpoint priorities of what to address and how to transform. Implementing this strategy will require a close collaboration with different industry associations to ensure focus on the priorities. This strategy will also help the Government better assess the broader needs, challenges and priorities of manufacturing firms in Perak.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Undertake comprehensive Industry 4.0 awareness program across all stakeholders with particular focus on SMEs	Jun - July 2022	RM500 K	MCMC
Create tools and processes to help manufacturing and related services firms, assess their capabilities and readiness to adopt Industry 4.0 technologies and processes	July 2022 - Sept 2023	RM500 K	Digital Perak
Create a Digital Transformation Sandbox to enable firms to manage risks during testing or pilot stage	July 2022 - Sept 2023	RM500 K	Digital Perak
Establish collaborative programmes with other countries that are leading in the Industry 4.0 transformation to share best practices and help guide Malaysia's programmes for optimal impact	July 2022 - Sept 2023	RM500 K	Digital Perak
Encourage the deployment of Industry 4.0 technologies that are essential for SMEs manufacturers' growth	July 2022 - Sept 2023	RM300 K	Digital Perak
	Jumlah	RM1.6mill	

Expected Output:

- Increase in the understanding of the need, benefits and opportunities of Industry 4.0
- Increase the number of manufacturing firms adopting Industry 4.0 technologies and processes

Intervention Program 5:

Establish digital/technology labs to create awareness and understanding, foster adoption of new technology and facilitate the transfer of knowledge

Objective:

To foster a seamless and accelerated adoption of industry 4.0 technologies especially for SMEs.

Justification:

Digital and technology labs by manufacturing leaders create showcase for local companies, especially SMEs, to understand available and best-in-class technologies and practical use cases, and engage in collaborative deployment efforts. Public-Private Partnerships (PPPs) is a proven concept to help expedite the adoption of new technologies in priority areas. The Perak's Government should work with local and global leaders to establish more digital and technology labs and collaborative platforms through PPPs.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Support leading global and local industry leaders to establish digital and technology labs that showcase the potential applications, benefits and proof of concept of new technologies for industry adoption	Jun - July 2022	RM500 K	Digital Peraks
Create PPPs and collaborative programmes for manufacturing activities that foster digital adoption, collaborative deployment and development of local capabilities, especially in priority sectors and technologies	July 2022 - Sept 2023	RM1mill	Invest Perak
Provide local firms, especially SMEs, with open access to smart manufacturing research, tools and technologies and help them understand what can be applied in the early stages of adoption	Sept 2023 - Oct 2024	RM500 K	Digital Perak
	Jumlah	RM2 mill	

Expected Output:

- Improve access for local companies, especially SMEs, to key enabling Industry 4.0 technologies and partners
- Stronger collaboration in deploying new technologies across value chains
- Increase number of PPPs for industry, academia, Government and other stakeholders to work for a targeted outcome in Industry 4.0

Intervention Program 6:

Intensify research, innovation and commercialisation and entrepreneurship programs and activities in Industry 4.0 technologies and processes

Objective:

To increase the level of productivity in the manufacturing sector by 30%

Justification:

Growth opportunities in the manufacturing sector will need to be supported by technological innovation from both private and public research communities. Sustained growth in the manufacturing sector will require proactive investments in advancing and enabling Industry 4.0 technologies and processes. A further step up in Perak's innovation capabilities will be important to propel priority sectors and technologies and reinforce Malaysia's position as preferred high-tech manufacturing destination.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Identify technology development programmes on Industry 4.0 that strengthen the overall research, innovation, commercialisation and entrepreneurship (RICE) capacity and provide solutions for priority sectors	Jun - July 2022	RM300 K	Digital Perak
Improve understanding by, and access for, manufacturing firms of existing Industry 4.0 research facilities and ongoing R&D	July 2022 - Sept 2023	RM500 K	Digital Perak
Create technology development and experimentation labs for collaborative Industry 4.0 technology and solutions development	Sept 2023 - Oct 2024	RM2 mill	Digital Perak
	Jumlah	RM2.8 mill	

Expected Output:

- Increase in capacity and capability of Malaysian firms, start-ups, universities and research institutes in Industry 4.0 technologies
- Increase in production and commercialisation of high value and innovative products and services
- Positioning Perak as primary destination for high-tech industry

Intervention Program 7:

Enhance capabilities of existing workforce through national development programs design for specific manufacturing sectors

Objective:

To foster a seamless and accelerated adoption of industry 4.0 technologies especially for SMEs.

Justification:

Industry 4.0 is fundamentally reshaping the jobs landscape and will foster significant changes in how industrial workers perform their jobs. Entirely new jobs with very different skill requirements will be created, while some tasks will become obsolete. A qualified and skilled workforce is indispensable for the introduction and adoption of Industry 4.0. The technical knowledge required is high, and will be primarily recruited from the STEM (science, technology, engineering and mathematics) subjects. However, for some years the number of STEM graduates has fallen below expectations. There is an urgent need to create a skilled and diverse workforce, with high salary, both by upskilling the existing labour pool and by attracting and developing future talent in the manufacturing sector. Particular attention also needs to be given to reskilling and upskilling lesser-skilled workers to other sectors and activities. The transition to smart manufacturing business models, technologies and processes is rapidly changing the required skill sets for the existing workforce. Many firms, especially SMEs, will require more structured and up-to-date training and skills development avenues for developing and maintaining world-class practices and capabilities within their workforce, including experts with advanced Industry 4.0 knowledge. This strategy aims to both upskill the existing workforce and mitigate the potential impact on jobs.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Create an Industry 4.0 Talent Competency & Technology Mentoring programmes to drive broader workforce development initiatives in line with specific sector requirements	Jun - July 2022	RM500 K	Digital Perak/ HEIs
Establish Skills Certification programmes in Industry 4.0 areas	July 2022 - Sept 2023	RM500 K	Digital Perak
Develop tailored training courses for the reskilling of transitioning employees	July 2022 - Sept 2023	RM500 K	Digital Perak/ HEIs
Enhance classroom modules for intensive upskilling programmes by using augmented or virtual reality (AR/VR)	July 2022 - Sept 2023	RM500 K	Digital Perak/ HEIs
Enable the availability of data on Industry 4.0 talent and labour pools for the Government, academia and industry	July 2022 - Sept 2023	RM300 K	Digital Perak
	Jumlah	RM1.2mill	

Expected Output:

- Increase in overall labour productivity due to upskilling and reskilling of the existing workforce

- Increase in number of high-skilled and multi-skilled workers with high wages in the manufacturing industry, particularly in high value-added activities

Intervention Program 8:

Ensure the availability of future talent by equipping students with the necessary skillsets to work in the industry 4.0 environment.

Objective:

To foster a seamless and accelerated adoption of industry 4.0 technologies especially for SMEs.

Justification:

Ensuring the pipeline of future talent in the manufacturing sector is important as advances in manufacturing techniques and processes require a higher skilled and more educated workforce. The focus on technical and vocational education and training (TVET), and science, technology, engineering and mathematics (STEM) education will be of priority to ensure a continuous supply of highly qualified talent. Structured industrial training programmes between industry and academia are able to close the gap between classroom modules and skills required in the working environment. There is also a need to raise the profile of high-tech manufacturing industry as an attractive workplace and career option. This will be key to attracting more students to STEM subjects.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Increase funding for vocational education and training programmes	Jun - July 2022	RM500 K	MOE
Integrate theory and practical Industry 4.0 applications into tertiary education curricula, including structuring industry placement opportunities	July 2022 - Sept 2023	RM500 K	MOE
Promote manufacturing as a preferred option for high-skilled jobs to overcome public perception and attract both skilled labour and university graduates	July 2022 - Sept 2023	RM500 K	Digital Perak
Enhance and increase the capacity and capability of educators, trainers and instructors in the manufacturing-related education sectors	July 2022 - Sept 2023	RM500 K	MOE
	Jumlah	RM1.2mill	

Expected Output:

- Increase availability of Industry 4.0 talent pool for the manufacturing industry
- Increased number of TVET and STEM students
- Increased industry-academia collaboration

Intervention Program 9:

Introduce dynamic and innovative financial products to encourage the adoption of Industry 4.0 technologies & processes

Objective:

To foster a seamless and accelerated adoption of industry 4.0 technologies especially for SMEs.

Justification:

In fulfilling the needs of diverse and innovative businesses, the Government and private sector should spur the implementation of Industry 4.0 through dynamic and innovative funding options for local firms, SMEs and start-ups as well as MNCs.

Activities, Timeline and Cost Estimation

Activity	Period	Cost	Lead Agency
Explore the creation of Federal Government-led development funds for Industry 4.0	Jun - July 2022	RM200 K	Digital Perak
Create an enabling ecosystem to encourage financial service providers to provide various financing options for Industry 4.0	July 2022 - Sept 2023	RM300 K	Digital Perak
Explore and align new and existing alternative financing including venture capital, crowd funding and other intermediaries to expedite the adoption and implementation of Industry 4.0	Oct 2023 - Sept 2024	RM300 K	Digital Perak
	Jumlah	RM1.1mill	

Expected Output:

- A suite of comprehensive financial products that local firms, SMEs and start-ups as well as MNCs can leverage on in line with their needs in implementing and adopting Industry 4.0 technologies and processes, across all stages of business lifecycle
 - Development funds for adoption, development or deployment of Industry 4.0 technologies and processes
-

QUICK WINS

3.6 New Electrical and Electronics (E&E) Hub

3.6.1 Background

The electrical and electronics (E&E) sectors are crucial drivers of Malaysia's industrial development and contribute significantly to economic growth, export earnings, and employment. There are four sub-sectors of E&E, namely components (semiconductor, printed circuit board, and metal stamped parts), consumers (TV receivers, infotainment products, cameras), industrials (computers, telco equipment, office equipment), and electricals (distributions board, control panel, lightings). In Malaysia, the main component of the E&E sector is a semiconductor, which has contributed more than 60% of the total E&E export. In Perak, most of the E&E industry is highly concentrated in Kinta District, followed by Larut Matang and Selama, Kerian, and Hilir Perak, which only contributed 5% of the total E&E companies established in Malaysia.

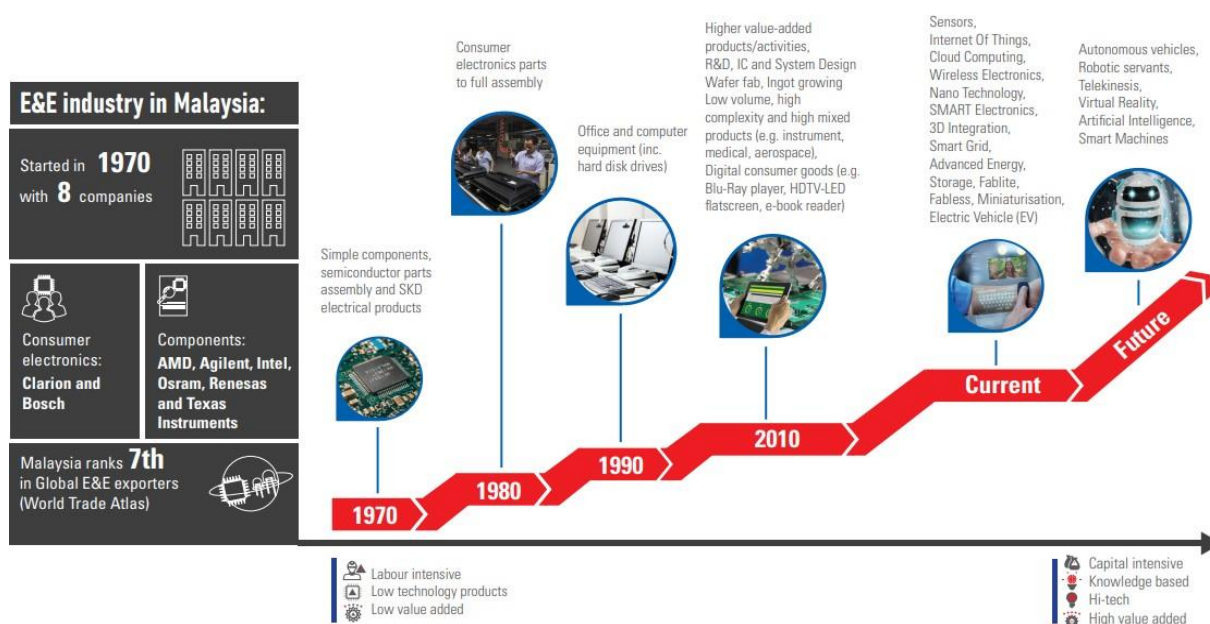
The importance of the E&E sector in the Malaysian economy has been highlighted in Twelfth Malaysia Plan (2021-2025), in which the E&E sector has been identified as a strategic and high-impact industry to propel Malaysian economic growth in the long run. Semiconductors, solar photovoltaic, light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services (MRS) have been identified as five high impacts (high quality) investments to sustain the development of E&E ecosystems under National Investment Aspirations (NIA). However, in Perak, these five key E&E sectors' development is left behind compared with Penang, Selangor, Kedah and Johor.

Thus, in line with the national E&E plan, the development of a new E&E hub at Perak, particularly at Kanthan (Silver Valley Technology Park), Lembah Beriah and Dennistown in Kerian and Autocity in Tanjung Malim, is warranted to attract a high quality of investment (new and re-investment) from local and foreign MNCs. In addition, due to the shortage of industrial land at Penang and Selangor and massive demand from the industry, Perak can

leverage this opportunity by providing a good investment infrastructure that meets the industry's needs.

Under the Twelfth Malaysian Plan (2021-2025) and National Investment Aspirations (NIA), E&E sectors have been recognised as the high impact industries that can propel economic growth in the long run. Thus, the primary strategies for E&E industries are strengthening the ecosystem for a higher value chain, promoting high adoption of technology, uplifting the development of talent and capability, and enhancing the Research and Development (R&D) as well as Design and Development (D&D). The main focus for E&E is promoting and strengthening high-quality investment, particularly in five key sectors, namely, semiconductor, LED, solar photovoltaic, electronics manufacturing service (EMS), and manufacturing-related services (MRS). Given this new E&E agenda, Perak should take serious action to strategise its E&E sector, particularly encouraging more high-quality investment with the element of ESG (Environment, Social, and Governance).

Figure 3.1: The Development of E&E Industry in Malaysia

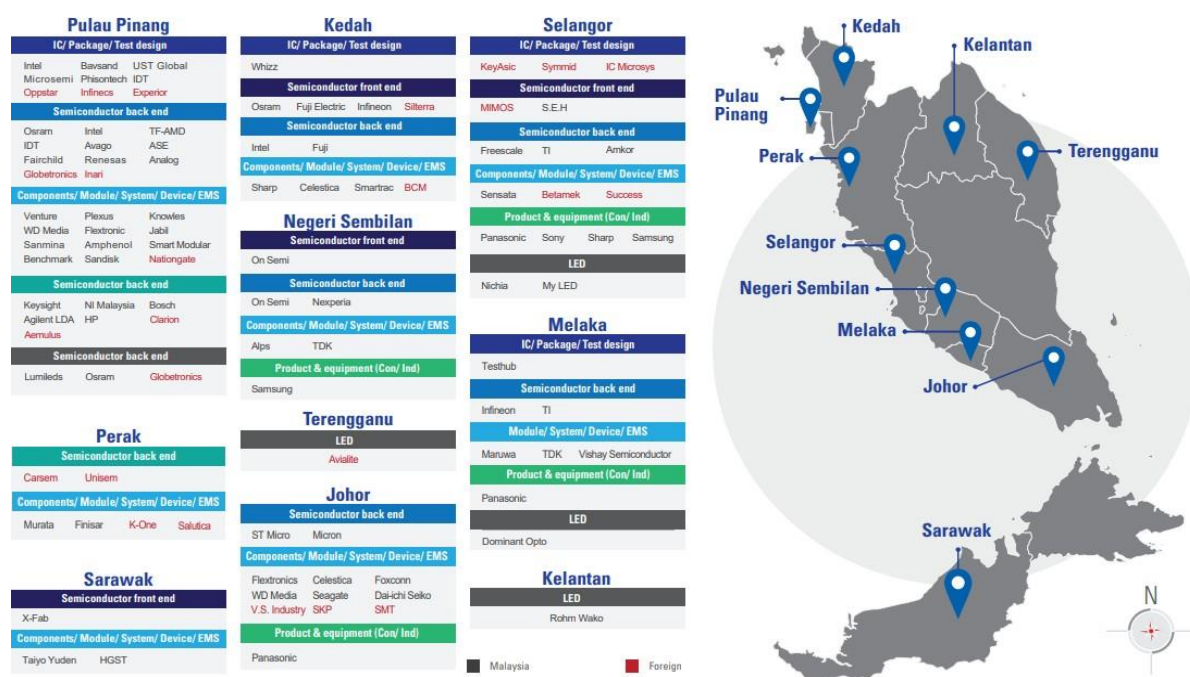


Source: MIDA, Malaysian E&E Industry

Figure 3.1 shows the development of the Malaysian E&E sector, which has significant changes from labour-intensive, low technology and low value-added (in 1970) towards higher value-

added product/activities (in 2010). The E&E industry has moved towards high technology in sensors, IoT, cloud computing, wireless electronics, nanotechnology, SMART electronics, 3D integration, and electric vehicles. In future, the E&E road map will be moving forward to high-tech industries such as autonomous vehicles, robotic servants, telekinesis, virtual reality, artificial intelligence, and smart machine. This new development of the E&E sector has heavily used capital-intensive, knowledge-based, high-tech and high-value-added. This development will change the country's E&E landscape and ecosystem and the talent capability to suit the industry needs.

Figure 3.2: Malaysian Electronic Cluster

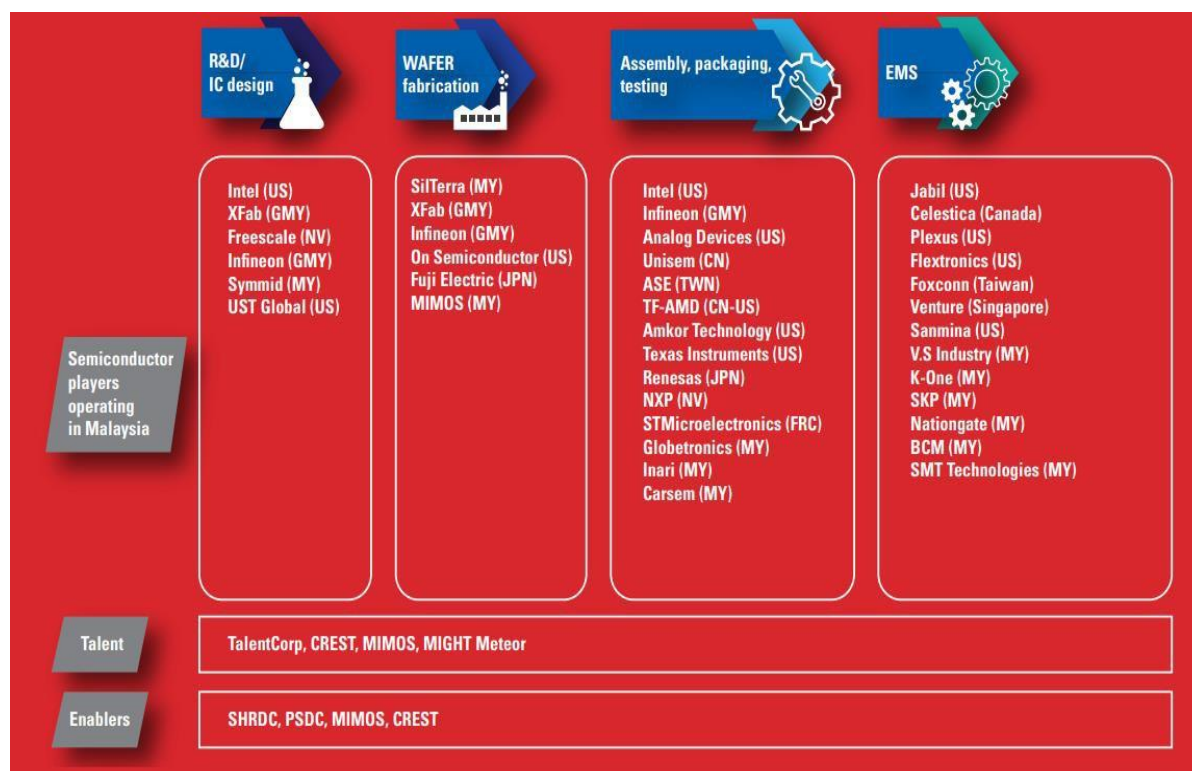


Source: MIDA, Malaysian E&E Industry

Most of the electronic industry focus on IC/Package/Test Design, semiconductor back end, components/module/device/system/EMS. Figure 3.2 shows that the Malaysian electronic cluster has highly concentrated in Penang, Selangor, Johor, Melaka, and Kedah. At Perak, the electronics industry has concentrated on the semiconductor back end (Carsem and Huatian Technology (Malaysia) - formerly known as Unisem) and components/module/system/device/EMS (Murata, Finisar, K-One, and Salutica). Given the

low concentration of the E&E sector in Perak, thus the establishment of a new E&E hub in SVTP at Kinta, Lembah Beriah and Dennistown, Kerian and Autocity, Tanjung Malim is warranted to increase the participation of new players in the industry.

Figure 3.3: Malaysian Semiconductor Ecosystem

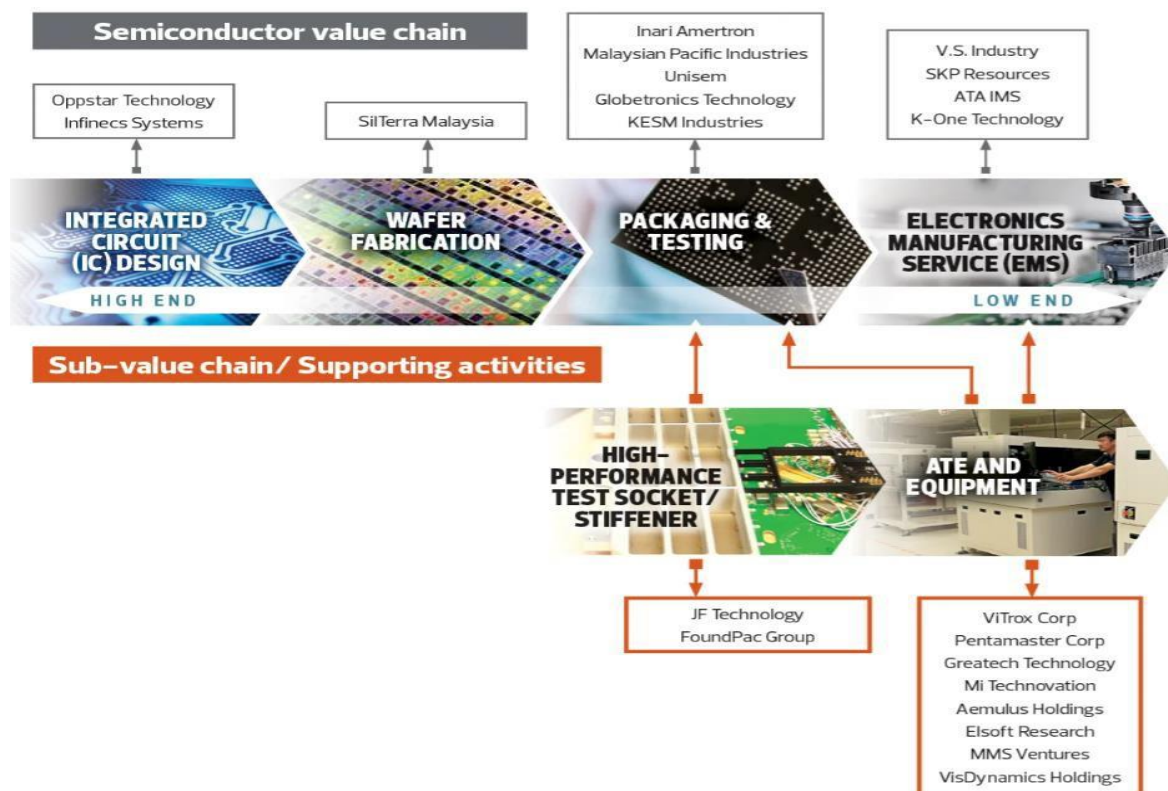


Source: MIDA, Malaysian E&E Industry

The main problem in E&E sectors is fewer players for homegrown companies, particularly for the semiconductors value chain. Most semiconductor companies are dominated by foreign companies (US and Germany). There is little involvement of homegrown companies. Most homegrown companies are concentrated in low-end activity, namely EMS. In terms of talent development, the semiconductors players can leverage the existence of human capital agencies at the national level, such as TalentCorp, CREST, MIMOS, and MIGHT Meteor, supported by the enablers such as SHRDC, PSDC, MIMOS, and CREST. Figure 3.3 shows that the semiconductor ecosystem has concentrated in four value chains, namely R&D/IC design, wafer fabrication, assembly, packaging, testing, and EMS. Figure 3.4 shows that the semiconductor value chain for homegrown companies is highly concentrated in low-end

manufacturing, and only a few companies are in high-end (front-end) manufacturing, for example, Opstar Technology and Infinecs Systems.

Figure 3.4: Homegrown Semiconductor Companies Value Chain



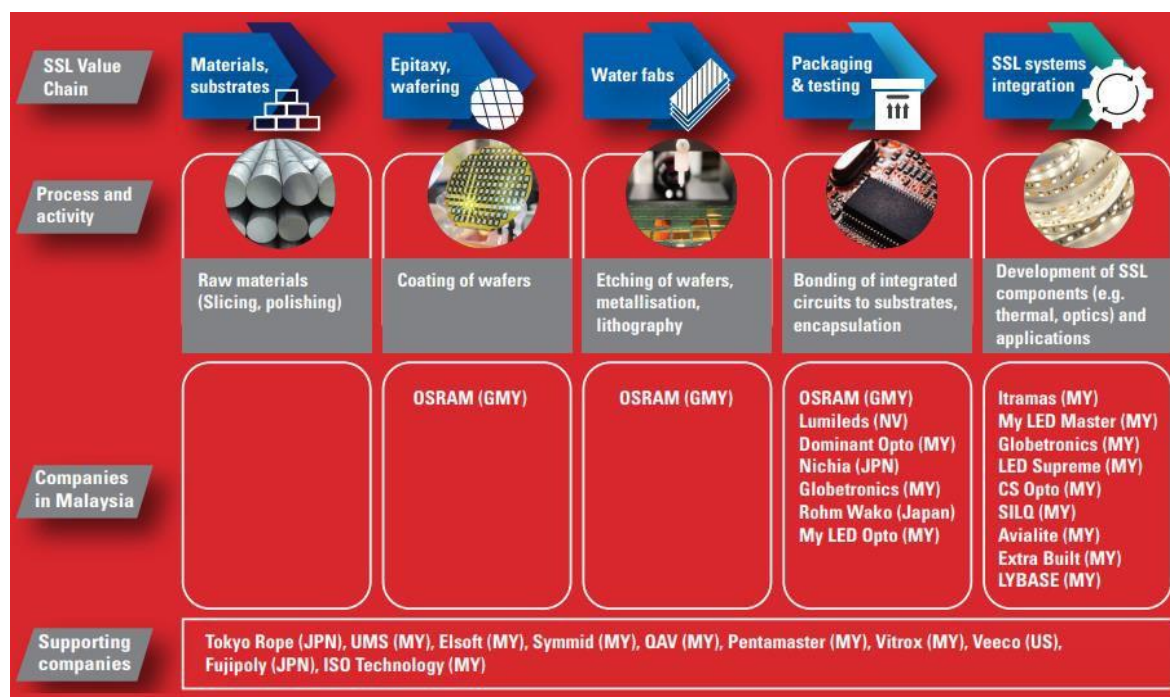
Source: The Edge Markets,, 2020.

The value chain of the Malaysian LED ecosystem (Figure 3.5) are focused on the materials and substrates, epitaxy and wafering, water fabs, packaging and testing, and SSL (Solid-state lighting) systems integration. The leading company is Osram (Germany). Malaysian companies are concentrated in packaging and testing (Dominants Opto, Globetronics, and My LED Opto) and SSL systems integration (Itramas, My LED Master, Globetronics, LED Supreme, CS Opto, SILQ, Avialite, Extra Built, LYBASE). However, most LED companies are located outside Perak. Thus, to encourage the LED players to invest in Perak, establishing a new industrial area as E&E hub is necessary to attract potential investors.

Most Malaysian solar companies are concentrated in system integrators (Eco-Gallery, Phoenix Solar, SOL Lite, and Gading Kenchana). Since no solar companies are operated in Perak, the establishment of E&E hub at Lembah Beriah and Dennistown, Kerian can be utilised to attract

the new players there. Figure 3.6 shows the five leading value chains of the solar ecosystem, namely R&D/design, metal/silicon polysilicon/ingot, solar wafer/cells, solar module, and system integrator.

Figure 3.5: Malaysian LED Ecosystem



Source: MIDA, Malaysian E&E Industry

Perak can give more focus on attracting potential investors (local and foreign) in five key sub-sectors, namely semiconductors, solar photovoltaic (PV), light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services. Thus, the establishment of Silver Valley Technology Park (SVTP) at Kanthan (Kinta), Lembah Beriah and Dennistown (Kerian) and Autocity (Tanjung Malim) has an enormous potential to attract high-quality investment in E&E by boosting the investment in high-value activities such as design and development (D&D) and front-end manufacturing.

There are four existing industrial hubs and six new initiatives industrial hubs. For the E&E sectors, FIZKinta has already been established for the place of many firms (domestic and foreign). Thus, developing a new E&E hub at SVTP Kanthan (Kinta), MK@SilverValley at Lembah Beriah and Dennistown (both at Kerian), and Autocity SilverValley (Tanjung Malim)

has expected to be a game-changer to that area and also for the whole Perak. This initiative will sustain and strive for inclusive development in Perak in the long run.

Figure 3.6: Malaysian Solar Ecosystem



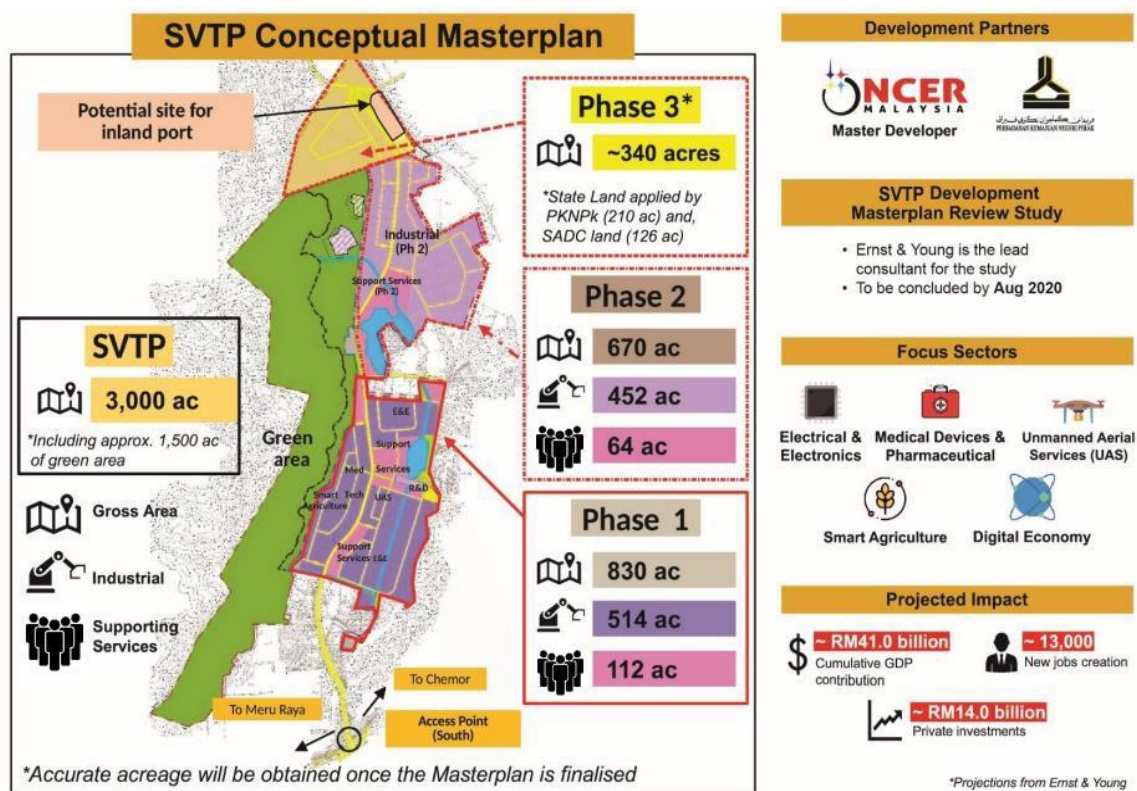
Source: MIDA, Malaysian E&E Industry

3.6.2 Potential for New E&E Hub

This initiative has expected to become a game-changer to the district and the Perak state. Establishing an E&E hub at SVTP, Kanthan, Lembah Beriah and Dennistown (Kerian), and AutoCity (Tanjung Malim) has a substantial potential economic impact on the Perak state. Figure 3.7 shows the Silver Valley Technology Park (SVTP) Masterplan at Kanthan, Kinta Districts. The significant industrial area of SVTP at Kanthan, which is roughly 3 000 acres, can be used for industrial concentration in high-tech industries such as E&E, medical products and pharmaceuticals, unmanned aerial services (UAS), smart agriculture, and the digital economy. Kinta district has five Mukim, namely Hulu Kinta, Sungai Raya, Belanja, Sungai Tera, and Tanjong Tualang, most of the industries are highly concentrated at Hulu Kinta. Thus, given the strategic location and rapid development in this area, the new initiative to establish SVTP at

Kanthan will accelerate Perak's economic growth through participating high-quality investors in E&E sectors and other industries.

Figure 3.7: Silver Valley Technology Park (SVTP) Masterplan, Kanthan, Kinta



Source: InvestPerak (online)

Another advantage is the proposal from MK Land Holdings Berhad to establish the new industrial area at Lembah Beriah, Kerian. With a total area of 2 800 acres, there is a vast potential for this area to become a game-changer in the northern region of Perak. Although the core business is the agricultural-based industry, given the strategic location, there is a vast potential to allocate some area for the E&E hub in the northern part of Perak to leverage the spill-over from Penang (notably Batu Kawan Industrial Park) and Kulim Hi-Tech Park (KHTP). In addition, Dennistown at Parit Buntar also has good potential as a new E&E hub, given the rapid development project in Parit Buntar, and has a strategic location with Penang Port and Penang Airport and the high value of the land.

Given Penang and Selangor's industrial land shortage, Perak can take leverage by attracting potential investors to invest in these areas. Currently, two E&E companies have already been established at Parit Buntar, Kerian, namely AEL Engineering Sdn Bhd and Scope Manufactures. The Kerian district maps, which consist of mukim Bagan Tiang, mukim Parit Buntar, mukim Tanjong Piandang, mukim Kuala Kurau, mukim Bagan Serai, mukim Selinsing, mukim Beriah, and mukim Gunong Semanggol. These two areas in Kerian District can also focus more on high-end manufacturing and high-tech industry, particularly solar photovoltaic. Mukim Parit Buntar and mukim Beriah have an enormous potential to develop the E&E hub in the northern region of Perak. The location is very strategic and near Penang, has easy access with PLUS (exit Alor Pongsu), and is located in the IMT-Golden Triangle.

Tanjung Malim has been known as Malaysia's automotive hub. Given the current development of electric vehicles (EV), the sub-sectors of E&E, namely electronic manufacturing system (EMS) and manufacturing related services (MRS) companies, are suitable to be located here to supply the raw materials in the automotive industry. With a very strategic location near Selangor and Kuala Lumpur, and excellent infrastructures, this area has the potential to be a new E&E hub in EMS and MRS sectors.

3.6.3 Implementation Strategy

The implementation strategy to strengthen the ecosystem of E&E in Perak are suggested as follows:

3.6.3.1 Development of New E&E Hub

Figure 3.8 show the proposed new E&E hub at three corridors in Perak. Greater KL corridor, which is Tanjung Malim, has the advantage of specialising in electronic management systems (ERS) and manufacturing-related services (MRS) due to the vast experience in the automotive industry and moving forward to establish electric vehicles. Firms in ERS and MRS can be the major input and raw materials suppliers to the automotive industry. The involvement of local SMEs in ERS and MRS also can be strengthened. Greater Ipoh (SVTP at Kanthan) has a significant advantage in specialising in the semiconductor and LED industry. In contrast,

Greater Kamunting (Lembah Beriah and Dennistown, Kerian) can specialise in solar photovoltaics and LED.

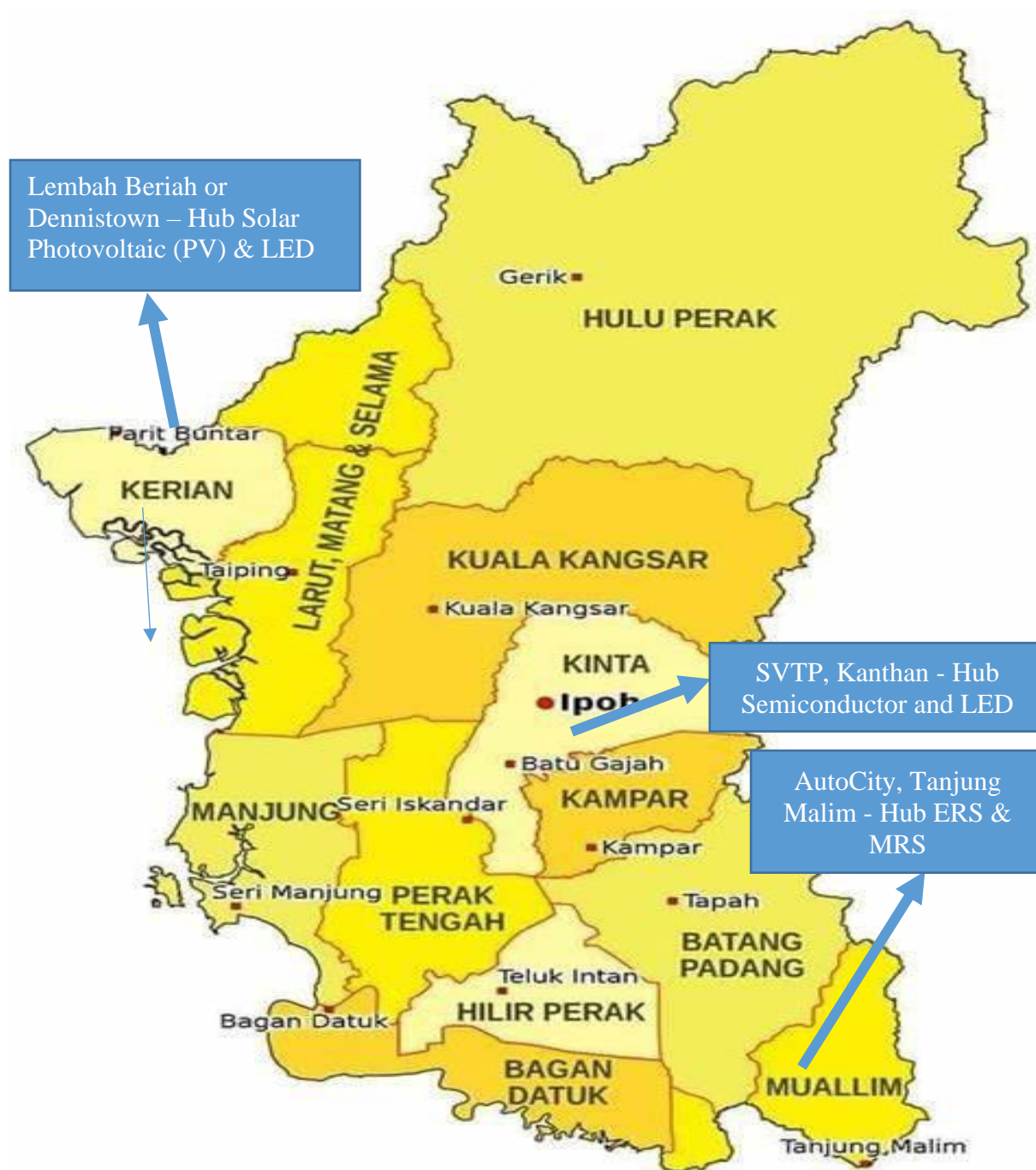
Kanthan can leverage the rapid development in Meru Raya and Chemor as a business zone to establish the high-tech E&E sector. This region also benefits from being close to the PLUS highway and the northern part (Penang and Kedah). However, the issue of illegal settlers at Kanthan needs to handle precisely by the Perak Government.

Lembah Beriah, Kerian, is also very strategic to establish the new E&E hub due to its strategic location, which is close to Penang. Thus, it can take advantage of the spill-over effect from Penang.

Further development of the E& E hub is necessary due to the congested industrial areas in Penang and Selangor and the high demand from the industry. Given its strategic proximity to Penang, Lembah Beriah and Dennistown, Kerian is ideal for establishing Perak's new hub of E&E sectors. This new E&E hub will serve the entire value chain of E&E activities, both upstream and downstream. As a result, more local SMEs will be encouraged to become strategic partners of the major E&E businesses. Batu Kawan Industrial Park and Kulim Hi-Tech Park (KHTP) might be the most incredible model for building Kerian District (Lembah Beriah and Dennistown) as the new E&E hub. This is critical for the future growth of Perak's E&E sector and inclusive development for all-region.

Since the establishment of Proton Tanjung Malim Sdn Bhd and Proton City, Tanjung Malim has been known as Malaysia's automotive hub. Given the current development of electric vehicles (EV), the sub-sectors of E&E, namely electronic manufacturing system (EMS) and manufacturing-related services (MRS) companies, are suitable to be located here to supply the raw materials in the automotive industry. With a very strategic location near Selangor and Kuala Lumpur and excellent infrastructures, this area can be a new E&E hub in EMS and MRS sectors.

Figure 3.8: Proposed New E&E Hub at Perak



Source: Authors

3.6.3.2 Upgrade Physical Infrastructure

To become a new hub of E&E in Perak and Malaysia, a huge investment is needed to upgrade the infrastructure, utilities, and facilities at Kanthan, Lembah Beriah, Dennistown and Tanjung Malim. Since modern infrastructure is the crucial factor that will attract new investment, Perak should speed up the infrastructure development process in this area. Investors typically will search the market to maximise the profit and reduce the cost of doing business if the infrastructure is in excellent condition and supportive of the investors. Batu Kawan Industrial Park can be the best model for Perak to establish the new E&E hub at Kanthan (Kinta), Lembah Beriah and Dennistown (Kerian) and Tanjung Malim (Muallim). Good physical infrastructures such as highways (roads), ports, and communications will likely attract the new investor. Thus PKNPk and NCER play a prominent role in upgrading the infrastructure development in this area. In addition, MK Land Holdings Bhd. and Proton Holdings also play a significant role in developing the infrastructures in Lembah Beriah and Tanjung Malim, respectively. The development of infrastructure in this area is in line with the latest SilverValley's idea of the focus on three main corridors, Greater Ipoh (Perak SilverValley Technology Park at Kanthan), Greater Kamunting (Lembah Beriah, Alor Pongsu (Kerian), and Greater Kuala Lumpur (Tanjung Malim).

3.6.3.3 Talent Development

The new roadmap under NIA that focuses on five main sectors, namely semiconductors, solar photovoltaic, light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services, will need specific skills to meet industry needs. Thus, talent availability and quality must be seriously concerned as they impede the industry's growth. More engineers in design and development (D&D) and front-end manufacturing, mainly IC Design Engineers, Embedded System/Firmware Engineer, Radio Frequency Engineers and Software Engineers, must supply to meet the industry needs. Based on feedback from the industry, recent engineers with academic training have not matched the demands of the industry. Thus, universities and vocational training institutes should respond by producing talent that suits the E&E sector needs through engaging with the industry in the curriculum or programme.

Developing talent based on the 'triple helix model' is crucial through collaboration between industry, academia (universities), and government agencies. The existence of some human capital agencies in Perak (Figure 3.9), for example, Perak Entrepreneur & Skills Development Center (PESDC), Pusat Aspirasi Anak Perak (PASAK), Advanced Technology Training Center (ADTEC Taiping), and Federation of Malaysian Manufacturers (FMM) Perak Branch are crucial to planning the suitable training/module with the industry, government agencies, and academia (universities). The specific training will provide qualified talent in the E&E industry that suits the industry's needs. The E&E industry also can take leverage the existence of several higher learning such as UTP, UTAR, Politeknik Ungku Omar, Politeknik Sultan Azlan Shah, Politeknik Bagan Datuk, and Institut Kemahiran MARA. These institutions play a crucial role in updating the recent skills and technology through upskilling and reskilling of their student before joining the labour market.

Figure 3.9: Existing Human Capital Agencies at Perak



Source: Online

Perak state needs to be forward-looking in planning the future talent that suits the industry's needs. Some initiatives can be considered through collaboration with state human capital agencies, industry players, and research institutes in Malaysia to provide the high-quality talent. The state can also leverage an R&D agency in the E&E sector at the national level. For example, Collaborative Research in Engineering, Science and Technology (CREST) specialises in R&D&I&C in the E&E ecosystem. Other agencies, like MIGHT, MARii, IMEN, and Malaysian Semiconductor Industry Association (MSIA), can also plan the talent development among the fresh graduate or upskill and reskill the existing engineers/technicians.

Maintaining the quality of the workforce is necessary to sustain the E&E industry. Given the current development of IR4.0 and IoT, new skills are warranted for this industry. Therefore, the ‘*quick-win*’ programme to train the manpower can be considered through collaboration with the university and industry players. E&E industry in Perak and young generations can leverage the existence of several training institutions and plan the training collaboration with the industry players and government training and research agency (PESDC, FMM, ADTEC, MARii, MIGHT, ext). Examples of the micro-credential programme offered by PESDC that can take leverage by industry are : Workforce Technical Transformation Programme (WTTP) and Industrial Skills Enhancement Programme (INSEP). Under WTTP, PESDC offers courses in line with E&E needs, such as industrial automation, machinist and CNC, welding, and automotive. Under INSEP, the main course is Optics Optoelectronics Technology, Broadband Communication Specialist, and Design of Automation Equipment Programme.

Industry, academia (universities), and state human capital agencies may consider the following micro-credential courses to reskill and upskill the microelectronics engineers in the E&E sector as follows:

- i. Technology for high-end general-purpose ICs
- ii. Integrated circuit advanced IC processing
- iii. Microwave circuit technology
- iv. Internet of Things (IoT) and sensing technology
- v. Cutting-edge nanoelectronics
- vi. Digital business technologies (including automation, artificial intelligence (AI), analytics, and machine learning)
- vii. Wireless and mobile technologies
- viii. Autonomous vehicles, 5G telecommunications, and artificial intelligence (AI)-driven technologies

3.6.3.4 Increase Participation of Local and Foreign Investors

Efforts to attract inward investment in E&E sectors require a strategy that focuses on the main pull factor at the SVTP, Kanthan (Kinta), Lembah Beriah and Dennistown (Kerian) and Autocity, Tanjung Malim (Muallim). Hence, to attract local and foreign investors to invest in these areas, several strategies are proposed as follows:

1. Increase Promotion

It is essential to increase the promotion of SilverValley Technology Park at Kanthan, Lembah Beriah and Dennistown (Kerian) and AutoCity, Tanjung Malim through the construction of unique (individual) websites, the provision of investment opportunity brochures, engagement sessions with potential domestic and foreign investors, and overseas investment mission by InvestPerak with the collaboration of states and federal agencies, for example, PKNPk, Menteri Besar Incorporated (MB Inc), MIDA, and Embassy Office. As the Centre of Investment (COI), InvestPerak need to identify potential local and foreign companies in the E& E industry, particularly in high-quality sectors such as semiconductors, solar photovoltaic, light-emitting devices (LED), electronic manufacturing services (EMS), and manufacturing-related services (MRS). InvestPerak needs to be more strategised by targeting top/big companies with an excellent track record in the high-quality E&E sectors.

Since Asia Pacific countries (Japan, China, Korea, and Taiwan) dominate most E&E companies in Malaysia, more efforts need to be strategised to attract new companies to invest in Perak. Examples of the top worldwide companies that InvestPerak can target to strengthen the semiconductor hub at Perak are shown in Table 3.1. Table 3.1 shows that most main semiconductors players come from the US, Japan, China, Taiwan, and Korea. Thus, InvestPerak and MIDA play a vital role in attracting these potential companies to strengthen the semiconductor hub, particularly at SVTP, Kanthan. With the cooperation of top semiconductor companies, engagement with these likely companies can establish the concept of SilverValley and help the national plan to focus on the high-tech industry.

Table 3.1: Potential Top Worldwide Semiconductors Companies

Companies Name (Country)	Companies Name (Country)
Qualcomm (US)	Hisilicon (China)
Applied Materials (US)	Kioxia (Japan)
Nvidia (US)	MediaTek (Taiwan)
Lam Research (Singapore)	SMIC (China)
Advanced Micro Devices (AMD) -US	ROHM (Japan)
Sanmina (US)	Sony Semiconductor (Japan)
KLA (US)	Hitachi ULSI Systems (Japan)
Analog Device (US)	Toshiba Corporation (Japan)
Microchip Technology (US)	Rohm Fukuoka (Japan)
Plexus (US)	Mitsui High-tec (Japan)
Skywork Solutions (US)	UMC (Taiwan)
Qorvo (US)	Media Tek. Inc (Taiwan)
Xilinx (US)	Realtek (Taiwan)
Teradyne (US)	CHIMEI INNOLUX (Taiwan)
Vishay Technology (US)	Macronix (Taiwan)
MKS Instrument (US)	SMIC (China)
Entegris (US)	HuaHong (China)
Maxim Integrated Product (US)	ASML (China)
Benchmark Electronics (US)	ASE (China)
TSMC (Taiwan)	NXP (China)
SK Hynix (Korea)	infineon (China)

Table 3.2 highlights the top companies specialising in electronic and electrical equipment that also can be considered by InvestPerak to promote the potential investment in the E&E hub at PSVTP, Kanthan; Lembah Beriah and Dennistown, Kerian; and Tanjung Malim. Most companies are listed in Fortune 500, and play a dominant role in the world market.

Table 3.2: Potential Top Worldwide Potential E&E Equipment Companies

Companies Name (Location)	Companies Name (Location)
Honeywell International (US)	Trimble (US)
Whirlpool (US)	Itron (US)
Corning (US)	TTM Technologies (US)
Rockwell Automation (US)	Belden (US)
Zebra Technologies (US)	Teledyne FLIR (US)
Vertex Holdings (Singapore)	Vontier (US)
Hubbel (US)	Regal Rexnord (US)
Acuity Brands (US)	A.O. Smith (US)

Table 3.3 summarises the potential big players in the LED industry. As can be seen, most of the top companies have come from the US, Japan, Korea, Taiwan, Germany, and Austria. Since LED is also considered a high-quality investment in E&E sectors, InvestPerak and MIDA need to attract these companies to invest at Perak. InvestPerak and MIDA may work with these businesses to showcase the benefits of Perak SilverValley as a new E&E centre in Malaysia.

Table 3.3: Potential Top Worldwide Potential LED Companies

Companies (Location)	Companies (Location)
Acuity Brands Lighting Inc. (US)	Topaz lighting Electrical Fittings Manufacturer (US)
Cree Lighting (IDEAL INDUSTRIES INC.) - US	Nora lighting (US)
Eaton (US)	Halco lighting technologies (US)
GE Lighting (US)	Westinghouse Lighting (US)
Philips Lighting/Signify (Netherlands)	WAC Lighting (US)
Osram (Germany)	Digital Lumens Inc. (US)
Nichia Corporation (Japan)	Hubbell (US)
Seoul Semiconductor (Korea)	LSI Industries Inc. (US)
Zumtobel Group (Austria)	LumiGrow (CA)
Everlight Electronics (Taiwan)	Siteco GmbH (Germany)
RAB Lighting Inc (US)	Signify Holding (Netherlands)
Kichler Lighting (US)	Semiconductor Co. Ltd. (Seoul Semiconductor) - US
Hubbell Lighting (US)	Zumtobel Group Ag (Austria)
Best Lighting Products (US)	

Table 3.4: Potential Top Worldwide Solar Photovoltaic Companies

Companies Name (Location)	Companies Name (Location)
LG Solar (US)	RenewSys Solar (India)
Hanwha Q Cells (Korea)	Vikram Solar (India)
SunPower (US)	SunPower (US)
Panasonic (US)	Global Brands Manufacture (GBM) - Taiwan
Jinko Solar (China)	Beyonics Technology -- Singapore
LONGi Solar (China)	LG Solar (US)
Tongwei Solar	Canadian Solar (Canada)
JA Solar (China)	Hanwha Q Cells (US)
Aiko Solar (China)	GCL System Integration Technology (China)
Trina Solar (China)	SFCE (Sun Feng International Clean Energy - China)
Canadian Solar (Canada)	Yingli Green (China)
Zhongli (Taiwan)	Renesola (China)
SunTech (China)	Sunpower Corporation (US)
First Solar (US)	REC Solar (Singapore)
Adani Solar (Indian)	

Solar photovoltaic is one of the high-tech industries under the new road map of the E&E industry. Thus, Perak can take forward-looking initiatives by attracting potential solar companies to invest at the E&E hub at Lembah Beriah, and Dennistown Kerian. Table 3.4 shows the potential leading players in the solar industry worldwide. As can be seen, most of the companies come from the US, China, Taiwan, India, and Singapore. Customised engagement with recognised solar enterprises can be planned to promote the benefits of investing in Perak's new E&E cluster.

Table 3.5 shows the potential big players in the EMS industry, which are dominated by Asian companies mainly from China, Japan, Taiwan, Singapore, and Hong Kong. Since EMS is also considered a high-quality investment under the Malaysian new road map, InvestPerak should make a serious effort to arrange the engagement session with the potential EMS companies.

Table 3.5: Potential Top Worldwide Electronics Management System (EMS) Companies

Companies Name (Location)	Companies Name (Location)
Foxcom (Taiwan)	SIIX (Osaka, Japan)
Pegatron (Taiwan)	UMC Electronics (Saitama, Japan)
Flex (Singapore)	Sumitronics (Tokyo, Japan)
Sanmina (US)	Integrated Micro-Electronics, Inc. (Laguna, Philippines)
Wistron (Taiwan)	Fabrinet (Pathumthani, Thailand)
BYD Electronics (China)	3CEMS Group (Guangzhou, China)
USI (Universal Scientific Industrial) (China)	Di-Nikko Engineering (Nikko, Japan)
Celestica (Canada)	VTech Communications (Hong Kong)
Kinpo Electronics (Taiwan)	WKK Technology Ltd. (Hong Kong)
Plexus (US)	Wong's International (Holdings) Limited (Hong Kong)
Hon Hai Precision Industry (Foxconn) (Taiwan)	Topscom Technology (Hong Kong)
Flextronics (Singapore)	Hana Microelectronics (Bangkok, Thailand)
New Kinpo Group (Taiwan)	Orient Semiconductor Electronics (Kaohsiung, Taiwan)
Shenzhen Kaifa Technology (Shenzhen, China)	SVI (Bangkadi, Pathumthani, Thailand)
Universal Scientific Industrial Co., Ltd. (USI) - Shanghai, China	PCI (Singapore)
Venture - Singapore	

2. Attractive investment Packages

Provide more attractive investment package proposals for each E&E sub-segment to attract new investment and re-investment in the E&E through fiscal and financial incentives. Current incentives at the central government level (specifically through MIDA and NCIA agencies) can be restructured accordingly and equipped with incentives at the state/district level incentives. Among the additional incentives that can be considered is a discount of land tax/lease/premise rental/factory building tax to the existing and new investors. Thus, the incentive should differ from other industries to attract high-quality investment in the E&E sectors.

InvestPerak and MIDA can attract the big ten semiconductors from Asia Pacific (China, Japan, Taiwan, and South Korea) for the 'quick-win' strategy. The semiconductor value chain is long and involves many specialised fields: equipment, Electronic Design Automation software (EDA), Intellectual Property core (IP), Integrated Device Manufacturer (IDM and fabless), foundry and Outsourced Semiconductor Assembly & Test (OSAT). This value chain of semiconductors can be strengthened through the involvement of local players as input suppliers under the Vendor Development Programme.

3. Affordable rental rates

PKNPk should increase its involvement through investment in building premises/factories for rental at affordable rates. The Ready Built Factory (RBF) concept can attract the participation of SMEs in E&E business and reduce their cost of doing business. Furthermore, a forward-thinking investment model is required to modernise Kanthan, Lembah Beriah, Dennistown, and Tanjung Malim to compete and complement other Industrial Parks in Penang, Kedah and Selangor. The new industrial area should be integrated with other facilities (hostels, the shopping centre/business outlet, recreational, ext.) that can offer an excellent condition of lifestyle.

4. Online database

Create an online database of potential E&E investment opportunities. For example, data on the status of industrial land (manufacturing area), the raw material value chain, human resources, the cost of doing business, and supporting infrastructure facilities can be provided by InvestPerak. The existing companies' data at Perak can also be centralised and available online to help the potential partner/collaborator in the industry. The data of potential investors also can be centralised and updated from time to time. This will help InvestPerak and MIDA to strategise the engagement/networking session.

5. Enhance governance

Strengthening the governance of the SilverValley Industrial Park through the establishment of Perak SilverValley Corporation (PSVCorp). This agency works in tandem with InvestPerak, whose main responsibilities include coordinating realised investments, assisting new and existing investors, planning the industry's value chain (promote the participation from local SMEs) , filtering proposed projects/investments (to ensure high-quality investments with an ESG component), monitor the local content, and strategising future planning for all SilverValley Park, ext. This is a forward-looking initiative to speed up the ecosystem and sustain the further development of all industries (in particular E&E).

6. The value chain of E&E's sustainability and the availability of raw resources.

The availability of raw materials in a sustainable manner is another crucial feature that draws investment. As a result, a unique strategy should be developed to assure a long-term supply of raw materials for the entire E&E value chain. This can be accomplished by establishing a Vendor Development Programme to plan the active engagement of SMEs in the E&E industry's value chain.

7. Talent development plan

This can be performed by partnering with training organisations in the E&E industry to provide the youth/employee upskilling and reskilling programmes to ensure that human capital meets

the industry's needs. The human capital agencies in Perak, such as PESDC, PASAK, ADTEC and FMM can coordinate this training programme in collaboration with industry, federal government agencies, and universities/TVET institutions.

8. Collaboration with others State Investment Authority (InvestPenang, InvestKedah and InvestSelangor)

InvestPerak should engage with Penang, Kedah and Selangor because they are more advanced and mature in promoting their E&E sectors. The spill-over effects from these three regions to Perak can be accelerated due to the collaboration (Northern and Southern parts). The sharing session of good practice in managing the E&E ecosystem, data and information sharing, investment mission, developing the industry's value-chain through the participation of local SMEs, and so on are examples of the collaboration.

3.6.4 Estimated Cost

The following is an estimate of the overall cost that needs to be prepared to ensure the feasibility of this action plan.

Activity/Strategy	Estimated cost*	Lead Agencies
Initiative 1: Development of New E&E Hub at SVTP, Kanthan (Kinta), Lembah Beriah (Kerian), and AutoCity, Tanjung Malim (Muallim)	RM55.15 million See Programme Intervention 1: Development of New E&E Hub at SVTP, Kanthan (Kinta), Lembah Beriah and Dennistown (Kerian), and AutoCity, Tanjung Malim (Muallim)	PKNPk, and NCIA
Initiative 2: Strengthening/Upgrade the Infrastructure Physical to Maximise the Potential of Kanthan, Lembah Beriah and Tanjung Malim as New E&E Hub	Budget from NCIA, and EPU	PKNPk
Initiative 3: Strengthening the human capital development in E&E Industry	RM475 000	PKNPk, NCIA, InvestPerak

	<p>See Intervention Programme (4), (5), and (6)</p> <p>i. Development of Talent Through the Empowerment and Coordination of Existing Perak Human Capital Agency</p> <p>ii. Establishing of Perak Microelectronics Training and Research Consortium</p> <p>iii. Enriched the collaboration between Industry and 4IR Agency/Centre</p>	
<p>Initiative 4: Attract the Participation of Local and Foreign Investors in the new E&E Industrial Park</p>	<p>RM500 000 (For promotional purposes, overseas working visits, industry engagement sessions, and update data)</p>	InvestPerak
<p>Initiative 5: Empower the value chain and the local content of the E&E ecosystem</p>	<p>RM590 000</p> <p>See Intervention Programme (7), (8), and (9)</p> <p>i. Development of Perak Data Center</p> <p>ii. Empower local SME E&E companies to penetrate the world market and global value chain</p> <p>iii. Establishing of Perak Integrated Vendor Development Programme (PIVDP)</p>	PKNPk, NCIA, InvestPerak

* *Cost estimates only. The responsible party should provide the cost of each activity.

3.7 Tanjong Malim Integrated Automotive Hub

3.7.1 Background

The global automotive industry is highly dynamic and competitive. Climate change and rapid development of new technology continues to play a critical role in transforming the market structure. This phenomenon threatens the existing local players and the local automotive industry, and at the same time offers opportunity for potential growth, especially a new market niche. This is especially true for a small emerging market like Malaysia where economy of scale is a disadvantage compared to neighboring countries such as Thailand and Indonesia.

Notwithstanding the above scenario, Malaysia has its own niche market for the local players. This is in line with the fact that Malaysia ranked third for the largest passenger car market as well as for the highest per capita income in ASEAN. Therefore, the critical events in the automotive industry occurring in the markets, be it locally or globally, is an opportunity for the Perak government to become the leading automotive industry players and investment location in Malaysia and to support the sustainable economic development in 10 years to come and beyond.

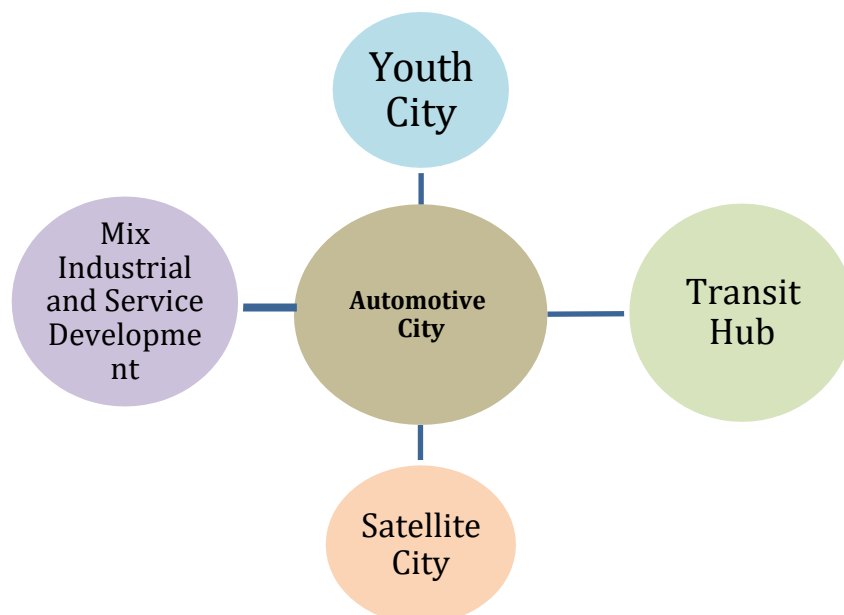
The critical juncture at this point is the development of a strategic plan and actions of the Perak government that can be implemented quickly so as to position the state as the leading investment destination of the future automotive industry in Malaysia.

A future plan of action for automotive industrial development is proposed to be developed based on the concept of knowledge economy and new technology adoption that safeguard sustainable development goals and strongly supported by world class infrastructure, digital technology and well developed and trained talents. This plan of action shall complement the overall and cross industries economic development of the state of Perak.

Since automotive industry is a global oriented sector and Malaysia is a small player in a huge market, international factors such as government policy, market structure and new technology development play an important role in the design of this strategic plan. Notably, the design takes into consideration the positioning of Malaysia and especially Perak in the

global automotive supply chain network. We believe that despite the national automotive policy the nation's automotive industry has to embrace the global forces and proactively compete by the terms and conditions of the global market and players.

Figure 3.10: Development Concept of Tanjong Malim Automotive Hub



Source: UKM Pakarunding

Based on RSN 2040 of Perak, we propose the development of Tanjong Malim Integrated Automotive Hub (Figure 3.10). This hub will mainly cover the areas including existing Tanjong Malim city, Proton City, and Behrang. Nevertheless, the spill over effect includes all areas of Southern Perak.

The development concept is based on the integration of four focus areas namely [1] automotive city, [2] satellite city, [3] transit hub and [4] youth city. In addition, we also proposed an additional focus area which is [5] mix industrial and service sector development. In doing so, the concept is built upon the notion that hub development is achieved by attracting industry and people, good governance, adoption of digital technology and confirming sustainable development goals. All these critical elements are not mutually exclusive but rather grew up in parallel and reciprocal.

3.7.2 Potential for Automotive City

Tanjong Malim has an advantage over other automotive industrial areas in Malaysia such as Pekan in Pahang, Gurun in Kedah, Penang and the Klang Valley. It is the hub of Proton manufacturing facilities. The Proton manufacturing plant is located in Proton City, an integrated township that crosses over 4,000 acres of land. The city was planned to consist of residential, commercial, institutional as well as industrial parcels and the Universiti Pendidikan Sultan Idris. In addition, the Proton City was also set up as a city with a complete automotive supply chain anchored by Proton and supported by the Proton vendors. These vendors are Tiers 1, 2 and 3 equipment and component manufacturers and assemblers. In addition, the city was strategically planned to accommodate about 200, 000 people to live and work there.

Another advantage of Tanjong Malim is the location of the Perodua manufacturing plant in Sungai Choh near Rawang. Sungai Choh is 40 minutes' drive via highway from Tanjong Malim. Proton and Perodua are the two biggest automakers in Malaysia and together they represent 62.1 % of passenger cars sold in Malaysia in 2020. Unlike Klang Valley that has experienced massive industrial development and where most automotive vendors are located, Tanjong Malim is underdeveloped. This means that Tanjong Malim can help Klang Valley to overcome massive traffic congestion, overpopulation and overcrowding that cause difficulties in fighting pandemics such as Covid19, industrialization that lead to global warming and climate change as well as high cost of industrial land. These justified the potential of Tanjong Malim to become a satellite city for the North Klang Valley.

As of now, the production of Proton and Perodua vehicles are in the ICE segment. Although most of the vendors have established their factories in other areas such as the Klang Valley, the growth of Proton market share will spur other vendors to move to Proton City as demand for the equipment and components increases and getting closer to OEM increases the efficiency of the supply chain.

The dynamic of the global auto industry and technology attract manufacturers to venture into the new but growing auto segment EEV and MaaS. In Malaysia this segment is

underdeveloped and most auto industrial areas have equal opportunities to attract domestic and foreign investment. However, Tanjong Malim has the advantage. In addition to the advantages mentioned earlier, the location of Tanjong Malim which is near Klang Valley and the availability of relatively cheaper industrial land will attract players to set up their plants.

The proposed development of sub sector EV complements the existing ICE subsector. Such that most existing ICE OEM and vendors eventually will also produce EV and the components by 2030. They will need new manufacturing plants and therefore areas to build the plant for producing EV components including the battery. The EV industrial area will include the new OEM and Tiers 1, 2 and 3 equipment and component manufacturers. Therefore, we propose a 1000-hectare industrial area for EV supply chain. The Tiers 1, 2 and 3 manufacturers will not only supply the EV equipment and components to OEM operating in Tanjong Malim but also to customers in other locations such as Klang Valley, Pekan and Gurun as well as export markets.

3.7.2.1 Satellite City

Due to the proximity of Tanjong Malim City to Klang Valley and Northern Selangor, the city has the strategic advantage to play a role as a satellite city. By satellite city, here we mean the city serves as an industrial hub to support the needs of the Klang Valley and works as the place to live and study. Therefore, the city needs to be developed to fulfil the needs of industry and community. Among the focus of development are the hospitality industry including hotels, private hospitals, hyper markets, shopping malls, international schools, entertainment centers, sport facilities and parks.

There are three categories of people, First, those who live and work in Tanjong Malim. Second, those who live in Tanjong Malim and work in other areas especially the Klang Valley. Third, those who work in Tanjong Malim and live in other areas outside Tanjong Malim. The development of the city should cater to the needs of these people.

3.7.2.2 Transit Hub

To complement Tanjong Malim as a satellite city, we propose the development of a transportation hub that connects Tanjong Malim with major areas in the Klang Valley, Northern Selangor, Southern Perak and various locations and cities across Peninsula Malaysia.

The hub will connect various modes of transportations such as high speed train, commuter train, buses including intercity express buses, taxi and e-hailing. It will serve the population of North Selangor for transportation to the northern and east coast of Peninsula Malaysia. On the other hand, people who live in Southern Perak will use the hub to travel to other areas in Klang Valley and Southern states of Peninsula Malaysia. The hub will be equipped with various facilities such as 5G to allow system communication among various modes of transportation for MaaS, shopping mall, car park and EV charging stations.

3.7.2.3 Youth City

Other focus area of development is the Youth City. Facilities to attract youth to come and stay in Tanjong Malim need to be developed. One of the main institutions that will support this development is Universiti Perguruan Sultan Idris (UPSI). UPSI has more than 20,000 students' population of which mainly youth. In addition, there is also a Polytechnic. Students from these institutions will play a critical role to ensure the utilization of the center and facilities. Intervention Program 7 is to make the city lively and therefore attract the youth to stay and work in Tanjong Malim. In addition to that, international centers should also be developed.

3.7.2.4 Mixed Industrial and Service Development

The development of automotive industry in all segments ICE, EV and MaaS should be supported by other industries especially electronic and electric (E&E) and service industry. This development not only helps to develop the complete supply chain of EV and MaaS but also facilitates the development of Intervention Program 7 by attracting more industrial players, service providers and people.

For mixed industrial areas, we propose the development of E&E and SMEs industrial areas. For the service sector we propose the development of data center, R&D lab, software development park and training institutions.

3.7.3 Implementation Strategy

The implementation programs of Tanjong Malim automotive hub aim to make Perak the leading state in Malaysia for automotive industry in term of employment, outputs, productivity, and new technology development.

3.7.3.1 The Development Plan of Tanjong Malim Automotive Hub

The development program of Tanjong Malim Automotive Hub started with the development of integrated and comprehensive plan. This plan must be based on the detail study and analysis taking into consideration not only the future needs of the industry but also the capacity of the state and district as well as the international standard infrastructures and facilities, especially in the long term. The estimated cost of this activity is RM150 000.

3.7.3.2 Development of Industrial Areas

Development of automotive hub must be supported by the development of related industries and services to ensure a strong supply chain hub and industrial sustainability in the future. This industrial development area is in addition to the Proton City where the Proton Assembly Plant and its vendors are located. Especially when the new subsector EV is increasingly becoming important segment in the global and domestic market. The EV segment and the yet to be fully developed NextGV segment requires high capacity of electricity supply, charging station and BET production. Therefore, the main supporting industry to be developed is the E&E sector.

In addition, the future of automotive industry such as MaaS amid the economic digitalization need to be supported with reliable telecommunication line such 5G and the data center. Thus, the service industry must also be the focus of the industrial development.

SMEs are crucial for future development because the local and national economy are highly dependent on SMEs for economic growth and employment. Therefore, several areas of SME

sub-clusters must be developed including automotive related software development, distribution and marketing of agricultural products that are produced in various areas in the Southern of Perak, and the start-up firm especially technology based initiated by the youth entrepreneurs.

The potential land areas need to be identified carefully to ensure efficient supply chain development within Tanjong Malim and future sustainable development of the industry. To be competitive the industrial area must provide facilities and infrastructure at par with local and regional competitors based on the concept of 'plug and play'. The estimated cost of this program is RM30 mill.

3.7.3.3 Improvement of Commercial Areas and Infrastructure

To attract quality investment of the local and international investors, the city and commercial areas must support the need of the players with world class facilities and infrastructure. At the moment, Tanjong Malim lacks the world standard quality hotels, commercial space and infrastructure especially the 5G. Therefore, existing commercial areas must be facelifted, new infrastructure must be developed and new commercials and hotel must be established. The estimated cost of this program is RM15 mill.

3.7.3.4 Establish Integrated Transportation Hub

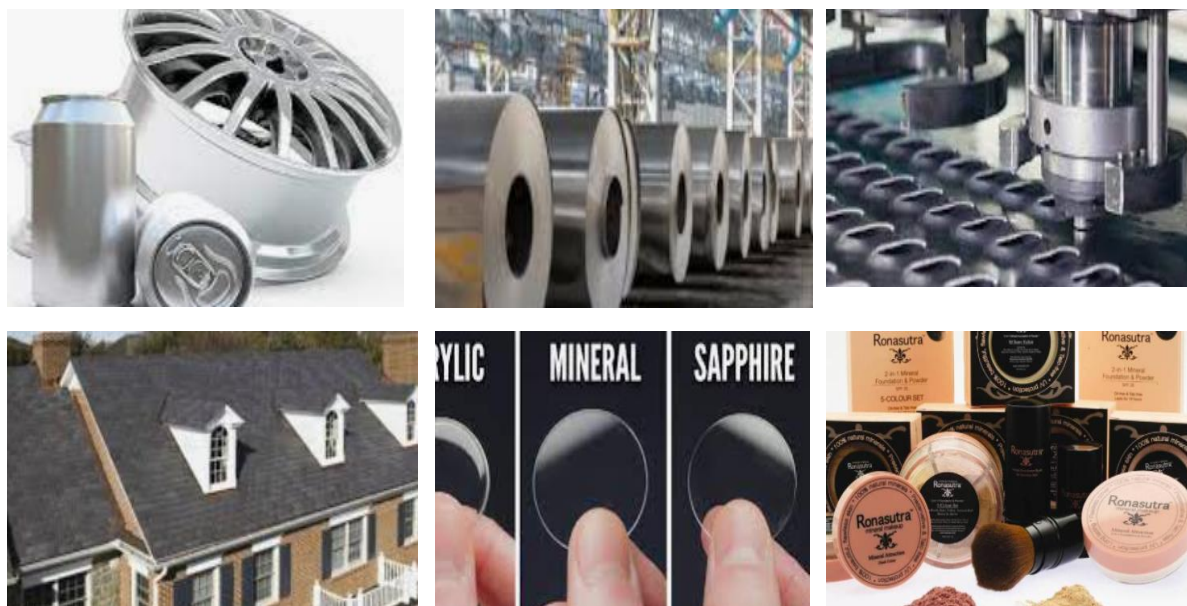
To bring more people to work, stay and visit Tanjong Malim, the strategic location of the city between North Selangor and Northern States of Peninsular Malaysia can be exploited by establishing Tanjong Malim as the transportation hub. The transportation hub or Integrated Terminal Tanjong Malim integrates the various mode of transportation such as buses (local, inter-city and inter-state express bus), commuter, high speed train, e-hailing and taxi. The hub aims to create network between major cities and various tourist destinations in Northern Selangor and Klang Valley and major cities and tourist destinations in Perak, Penang, Kedah, Pahang and Kelantan. The hub will be directly connected to KLIA, Subang Airport, and KL Sentral. The estimated cost of this program is RM50 mill.

3.7.4 Estimated Cost

The following is the overall estimated cost to ensure successful implementation of the action plan.

Activity	Cost	Responsible Party
Development Plan of Tanjong Malim Automotive Hub	RM150K	PKNPerak
Development of Industrial Area	RM30 mill	PKNP
Improvement of Commercial Area and Infrastructure	RM15 mill	PBT
Establish Integrated Transportation Hub	RM50 mill	PBT
Total Estimated Cost	RM95.15 mill	

3.8 Mineral-based Industry Park



3.8.1 Background

Mineral-based industrial cluster, which comprises the sub-industries of basic metal and fabricated metal products and non-metallic mineral products, has a huge global market worth USD737.4 billion (~RM3.05 trillion) in 2019. The metallic products sub-industries were worth RM2.985 trillion while the non-metallic mineral products sub-industries were worth RM69 billion in 2019. This value accounts for 4.08% of the world trade value (USD18 trillion or RM74.8 trillion), and 3.3% is contributed by the upstream metallic mineral industries.² This market share represents huge opportunities to create values from this industry. As reported by the Business Research Company (BRC), the global metal and mineral market had grown by 9.8%, from USD6,320.71 billion in 2020 to USD6,937.72 billion in 2021 (BRC, 2020)³. The market is expected to expand at a slightly lower rate as companies worldwide rearrange their operations and recover from the COVID-19 impact. The pandemic had led to restrictive

² Source: Observatory of Economic Complexity (OEC) database at <https://oec.world/en/>

³ Source: BRC at <https://www.thebusinessresearchcompany.com/report/metal-and-mineral-global-market-report-2020-30-covid-19-impact-and-recovery>

containment measures involving social distancing, remote working, and the closure of commercial activities that resulted in operational challenges. BRC forecasted that the market will reach USD9,021.86 billion in 2025 at a CAGR of 7%.

The global mineral-based product markets, which recorded a world trade value of RM2.985 trillion, are dominated by China, followed by India, Japan, Brazil and the US. As reported in Table 3.6, Malaysia is a smaller player in the global market with a market share (estimated Based on the number of companies) that is consistently less than 1.75%. Based on the survey results, China is the main supplier of materials for mineral-based industries in Perak. Among materials (number of companies) that Perak's companies imported from China are steel (20), metals (12), plastic (5), aluminium (5), iron (2), connectors (1), HPA (1), calcium carbonate (1), marbles (1), minerals (1), glass (1), fabricated metals (1), polypropylene filter nozzles (1), stone (1), and alloy (1).

Since China is the main producer in this industry, contributing 21% to 55.8% to each of the sub-sectors listed in Table 3.6 (except for metal coating, engraving and heat-treating manufacturing), Perak's industries are not likely to experience supply shortage. However, the threat of relying on dominant suppliers would come from their abilities to control the prices of the materials and country risks. It is important to note that China is one of Malaysia's biggest foreign direct investors.

Besides the trivial global market share, Malaysia's production also hasn't fulfilled the local demand for mineral-based products. The country imported RM90.96 billion worth of minerals and mineral-based products, surpassing RM59.40 billion worth of exports. As shown in Table 3.7, companies in Malaysia are more focused on aluminium and metal valve and pipe fitting manufacturing. Malaysia has not developed the metallic products sub-sectors including primary metal products.

Table 3.6: Malaysia's market share in the global basic metal and fabricated metal products, based on the number of companies

Sub-sector	Description of mineral-based products	China (%)	M'sia (%)
Primary Metals manufacturing	Companies in this industry engage in smelting and refining of ferrous and nonferrous metals and include iron and steel mills, rolled steel shape manufacturers, aluminium producers, and copper foundries.	36.9	0.05
Steel Production	Companies in this industry engage in converting pig iron to steel, making steel, and manufacturing steel shapes, pipes, and tubes.	23.2	0.30
Aluminium Production	Companies in this industry process and manufacture alumina, aluminium and aluminium products.	37.0	1.75
Architectural & Structural Metals manufacturing	Companies in this industry manufacture metal framed windows and doors, sheet metal work, ornamental or architectural metal products, prefabricated metal buildings, and structural metal and metal plate work products.	24.1	0.11
Metal Coating, Engraving & Heat Treating	Companies in this industry engage mainly in one or more of the following metal treating activities: heat treating; hot dip galvanizing; enamelling, lacquering, and varnishing; power coating and electroplating; and etching.	< 10	0.21
Metal Valve & Pipe Fitting manufacturing	Companies in this industry manufacture metal industrial and fluid power valves, hose fittings, and pipe fittings.	55.0	1.75
Metalworking Machinery Manufacturing	Companies in this industry manufacture metalworking machinery, including moulds, dies, cutting tools, and machining centres.	40.2	0.08
Fabricated Metal Product Manufacturing	Companies in this industry transform purchased metals into intermediate or end-use products by forging, stamping, bending, forming, welding, machining, and assembly.	42.9	0.11

Source: Dun & Bradstreet (<https://www.dnb.com/business-directory/industry-analysis>).

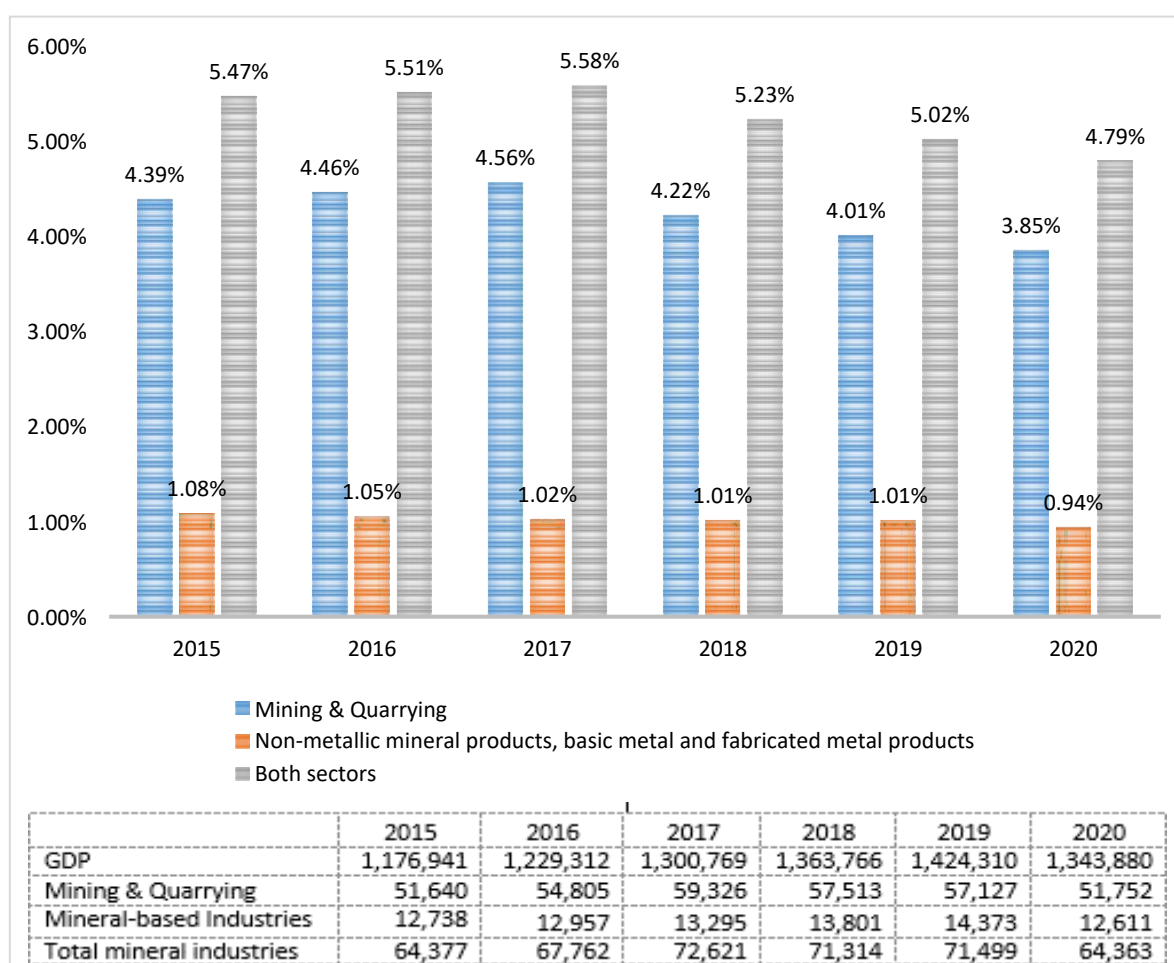
In addition to the statistics in Tables 3.6 and 3.7, the Dun & Bradstreet industry database also indicates that Malaysia's mineral-based industries are less competitive than its neighbouring countries (Indonesia, Singapore, Thailand, Indonesia, and Vietnam). However, because Malaysia is rich in mineral deposits, it has a huge opportunity to leverage its mineral resources. Based on a study by the Minerals and Geoscience Department (MGD), the country's mineral resources are worth RM4.11 trillion, comprising metallic minerals worth RM1.03 trillion, non-metallic minerals (RM2.96 trillion), and energy minerals (RM120 billion). As shown in Figure 3.11, the contribution of Mining and Quarrying is always four times higher than the manufactured mineral-based products throughout the 2015-2020 period.

Table 3.7: Malaysia's market share in the non-metallic mineral products, based on the number of companies

Sub-sector	Description of mineral-based products	China (%)	M'sia (%)
Abrasives	Companies in this industry manufacture coated and bonded abrasive products, including grinding wheels, sandpaper, and abrasive grains.	55.8	0.63
Asphalt Products	Companies in this industry manufacture asphalt and tar mixtures for paving and blocks, as well as asphalt shingles, roofing cement, and coatings.	33.7	0.27
Cement & Concrete Product	Companies in this industry manufacture cement, ready-mix concrete, and concrete products such as blocks, pipes, bricks, walls, and girders.	21.0	0.48
Clay Product & Refractory	Companies in this industry manufacture clay pottery, ceramics, plumbing fixtures, building materials, and refractory products.	52.8	0.20
Glass & Glass Product	Companies in this industry manufacture glass and glass products, including glass containers, flat glass, fibreglass, and speciality glass products.	39.7	0.63
Non-metallic Mineral Product	Companies in this industry manufacture clay products and refractories, glass and glass products, cement and concrete products, lime and gypsum products, abrasives and other nonmetallic mineral products.	39.7	0.21

Source: Dun & Bradstreet (<https://www.dnb.com/business-directory/industry-analysis>).

The OEC statistics show that the world trade value of non-metallic mineral products is much smaller than metallic products, around RM69 billion because the materials are normally much cheaper than for manufacturing metallic products. The non-metallic mineral resources are normally more abundant than metallic minerals and international trading might not be cost-efficient because they are heavy and bulky but cheap. Although Malaysia is considered one of the economies that rely on natural resources, its non-metallic mineral industries are underdeveloped. Malaysia has less than 0.63% of the total non-metallic mineral product companies worldwide. Its ability to penetrate the global markets might be limited due to the smaller geographical size, indicating local production is mostly used to meet the local demands for constructions and other local productions.

Figure 3.11: Contribution of Mineral-based Industries to Malaysia's GDP

Notes: The actual values of non-metallic mineral products and basic metal and fabricated metal products were higher than depicted in the figure because for some states including Selangor, the products were not reported in a separate category. The mineral-based industry refers to non-metallic mineral products, basic metal and fabricated metal products.

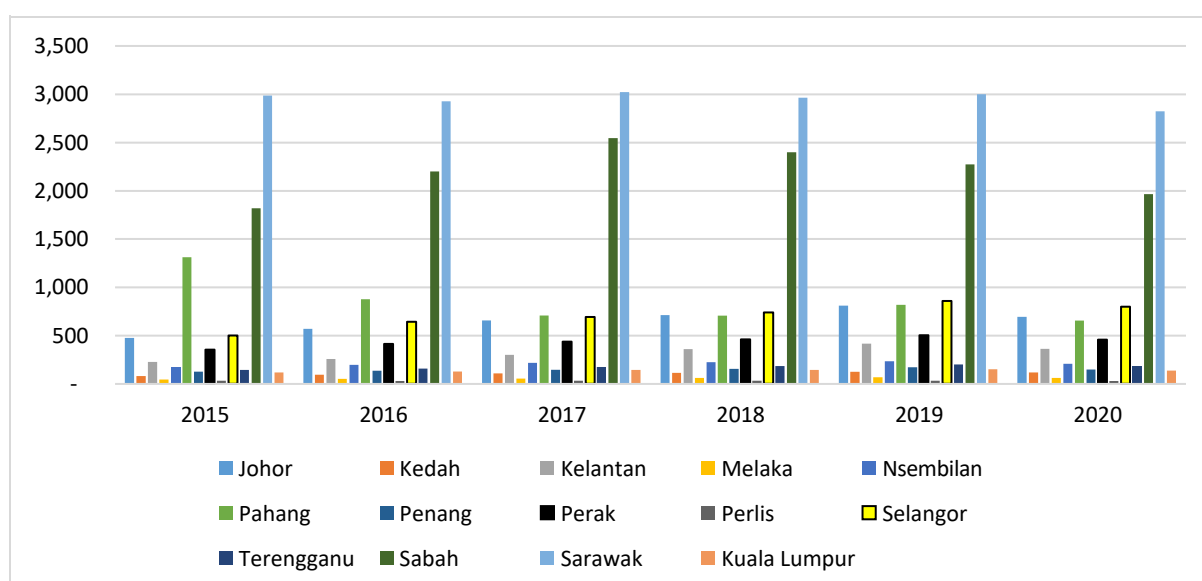
Source: Data from DOSM: GDP by State

It showed In Figure 3.11 that mineral-based products contribute about one-fourth of the value of mineral resources. Based on the insignificant market share that Malaysia has in the global immediate and downstream products market, industry players in this country are in need of strategic partners that would be able to help us develop the industries. The government has acknowledged this weakness in Malaysia's mineral-based industries and addressed it in the National Mineral Industry Transformation Plan 2021-2030 (TIM 2021-2030 Plan). The Plan proposes increased efforts in gaining international collaboration to expedite technology transfer and foreign investment in the mineral sub-sector and mineral-based manufacturing sub-sector. The objective of the Plan is for mineral-based products to

contribute RM29 billion (1% of GDP) to GDP by 2030, which implies that the industry will grow by 8.11% per annum, considering the industry has been generating an average of RM13,296 mill per year between 2015 and 2020 (refer to figures at the bottom of Figure 3.11).

Perak has always been known for its rich mineral resources, and its contribution to the country's GDP has remained among the most important. It has been the main producer of tin ores, which contributes to Malaysia's role as one of the top tin producers globally. As depicted in Figure 3.12, *aside from Sabah and Sarawak*, Perak is the fourth producer of mineral resources throughout the 2015-2020 period. Sabah is known for its copper production but it is also one of the major producers of crude oil, refined petroleum, and liquefied natural gas, besides Sarawak and Terengganu. Perak has one of the largest reserves of metallic minerals (tin and iron ore) and non-metallic minerals (ball clay, limestone, rock aggregates, feldspar, mica, silica sand, kaolin, quartz rock). The state is also the largest producer of metallic minerals like monazite, xenotime, tin-in-minerals (82%), ilmenite, rutile, and zircon.

Figure 3.12: Distribution of Mineral Mining and Quarrying Values (RM mill) by State



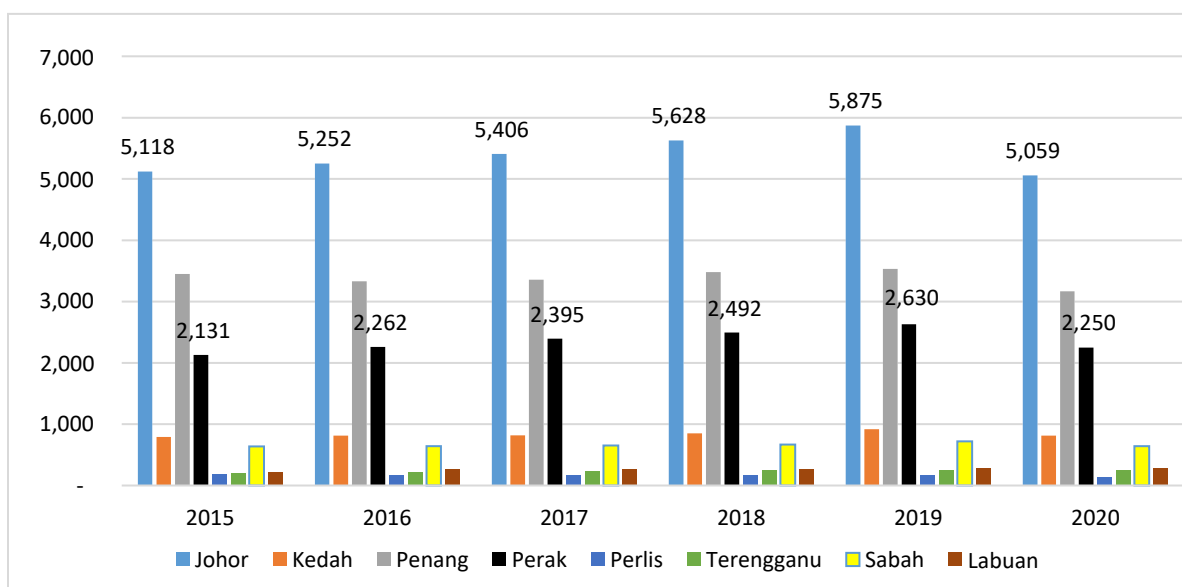
Notes: Values of mineral mining and quarrying for Sabah and Sarawak are stated per tenth due to their very high values than other states.

Source: Data from DOSM: GDP by State

The national initiatives to develop the Mineral-based industries should include Perak since the state has shown its potential as one of the major industry players in Malaysia. As depicted

in Figure 3.13, Perak's mineral-based industry consistently ranked third in its contribution to the country's GDP, behind Johor and Penang. Based on the survey that we conducted on the industry players in this state, internationalization is quite extensive. However, it is mainly due to the import of production materials (62%) in particular from China (68%). Materials imported could have been produced domestically, but cost and specification become the main hindering factor. Export of this industry is very limited (19%) and mainly within the ASEAN region.

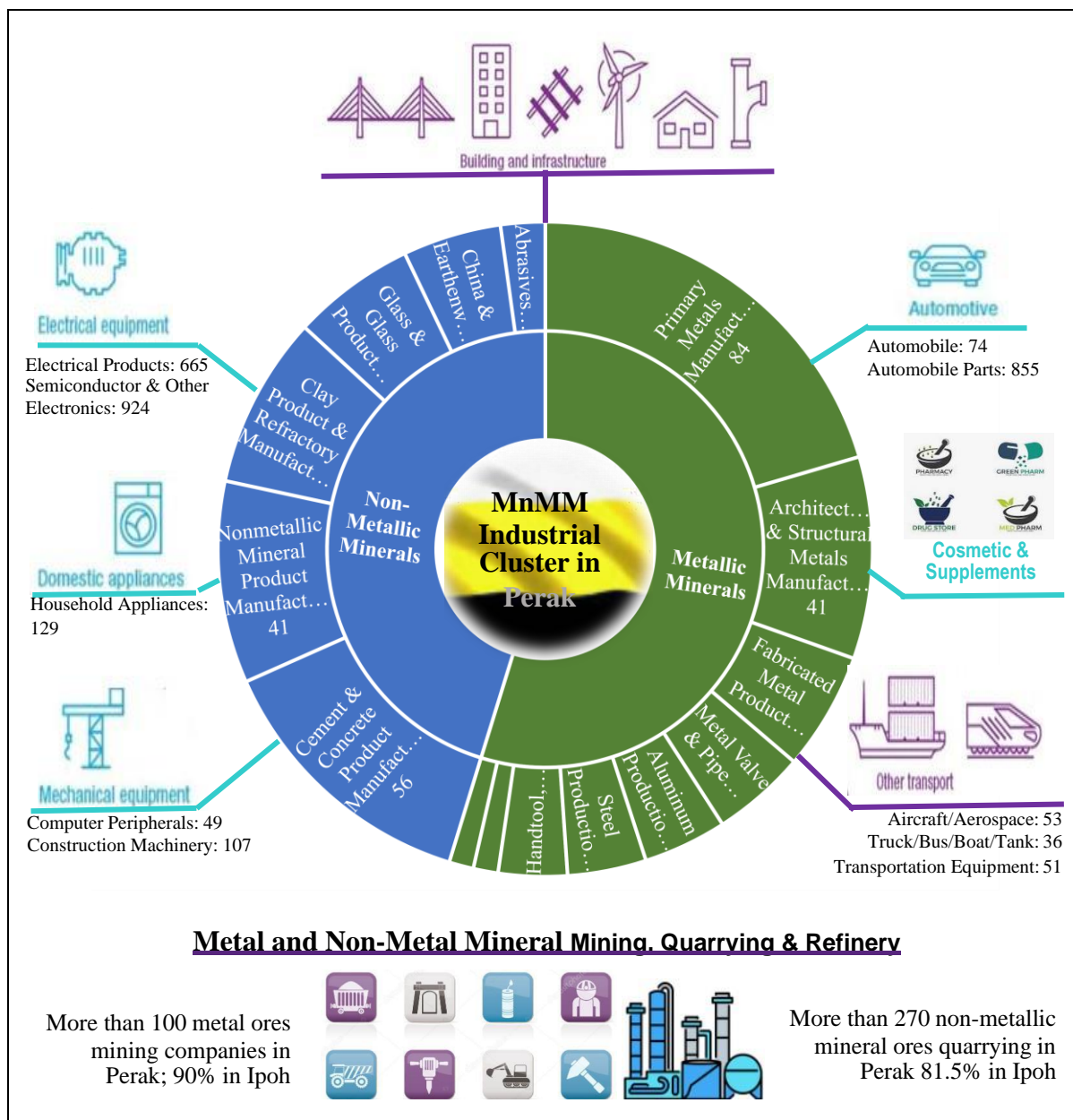
Figure 3.13: Distribution of Mineral-based Products Values (RM mill) by State



Notes: Selangor is one of the states that produce mineral-based products. However, the DOSM statement does not report this category as one of Selangor's manufacturing activities.

Source: Data from DOSM: GDP by State

Under 12MP's Strategy B1: Enhancing Supply Chain Sustainability, Malaysian companies are encouraged to increase cooperation with foreign companies to facilitate the transfer of technology and knowledge and develop a skilled domestic workforce. Perak stands a great chance in the mineral-based industries by benefiting from a sustainable supply chain, as shown in Figure 3.14. To begin with, mineral-based companies in Perak has a competitive advantage in the sense that mineral resources are abundant. The State is the largest producer of tin in Malaysia and also among the major producers of a variety of other non-metallic minerals such as limestone, kaolin, clay and mica.

Figure 3.14: Creating Supply Chain for the mineral-based industrial cluster in Perak

Source: Companies data from Dun & Bradstreet. Numbers associated with mining and quarrying and mineral-based industries indicate the number of companies in Malaysia, except when stated otherwise.

Based on the company data collected from the Dun & Bradstreet database, there are more than 90 metal ore mining companies including 7 tin mining companies and more than 220 non-metallic mineral mining and quarrying companies in Perak.⁴

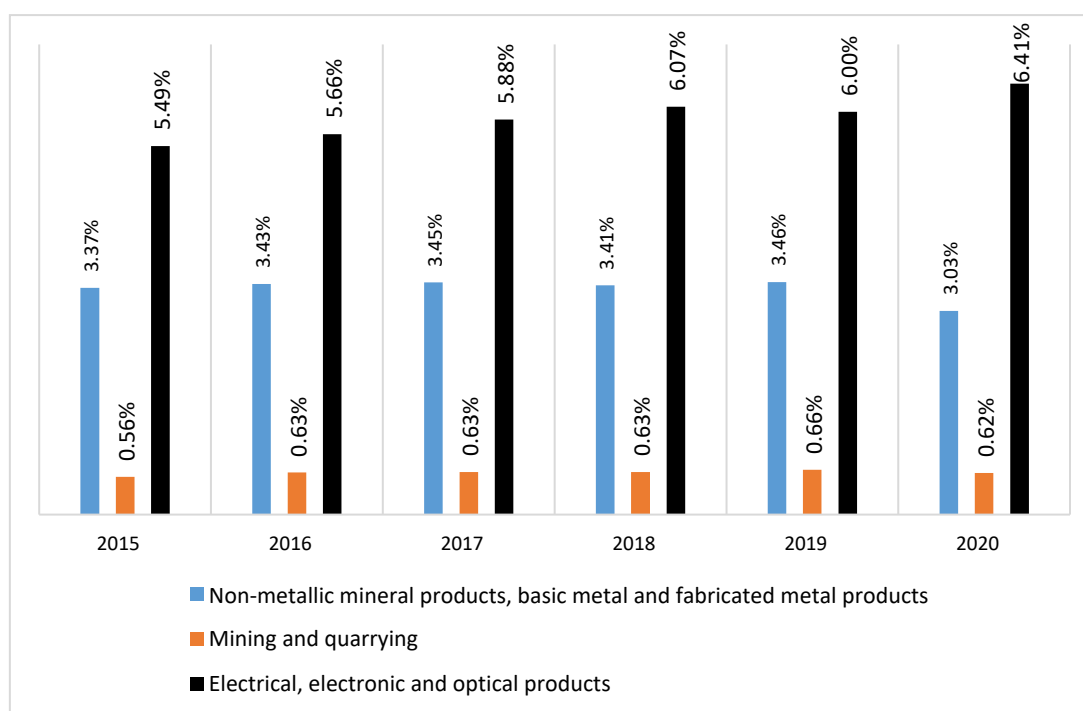
Figure 3.14 also shows the related industries that serve as the market for the mineral-based industries. As indicated from the result of the UKM Team Survey, companies in Perak rely mostly on local markets and export only to the neighbouring ASEAN countries. The domestic market for mineral-based industries is rather large. Except for the Cosmetic and Supplements industry whose number is not exclusively recorded in the Dun & Bradstreet database, other related industries have a large number of companies operating throughout the country. The efforts to break into the related industries would be a challenging but necessary task for Perak. As shown earlier in Figure 3.14, the three biggest players of each related industry in Malaysia are the neighbouring states of Perak, namely Selangor, Kuala Lumpur and Penang. For instance, Malaysia is known for its E&E industry and 929 of those companies are recorded in Dun & Bradstreet. The fact that only 55 of the E&E companies are located in Perak suggests that companies in mineral-based industries in this State have to look for the larger markets outside the State. They can look for opportunities in Selangor, Kuala Lumpur and Penang where there are 389, 327, and 301 E&E companies.

Positioning Perak as one of the country's producers of mineral-based products is also consistent with the aspiration to transform Malaysia into a high-income economy. Although Perak is one of the country's major producers of mineral resources in Malaysia, its mining and quarrying sector only contributed to about 0.65% of the State's GDP. The State has realized greater value-added activities from the immediate and downstream products. As shown in Figure 3.15, it is the mineral-based products industry that more the State's GDP, i.e., consistently about 3.4% per year. This trend suggests that including Perak in the manufacturing upgradation programs would help the country realizes the goal of making the mineral industry a major contributor to its GDP by 2030. It is also important to note that the

⁴The numbers reported by Dun & Bradstreet are smaller than those reported by the Mineral and Geoscience Department of Malaysia (shown earlier in Table 3.8). However, because the report is consistent across industries and countries, it is a good estimate to draw upon a plan.

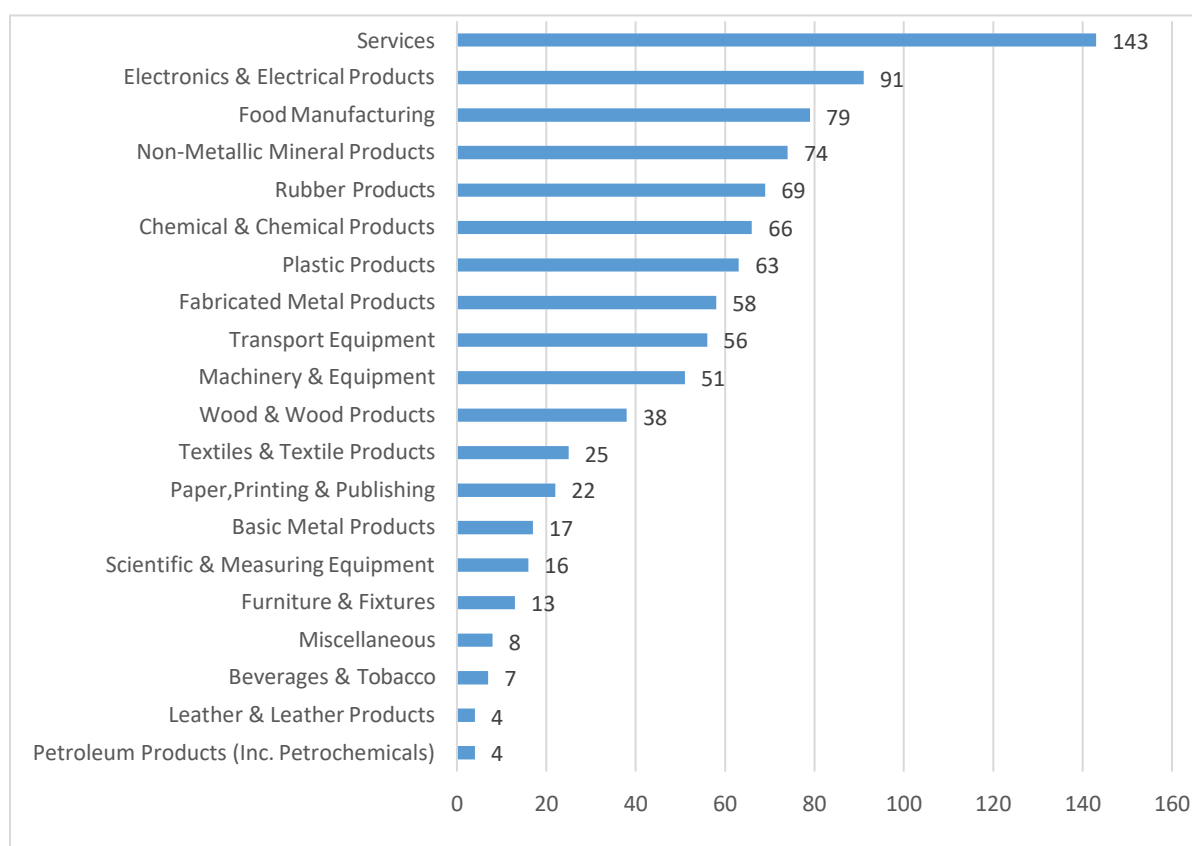
mineral-based industry serves as the second-largest contributor to the State's GDP from the manufacturing sector, i.e., after the E&E sector which contributes about 6%. Developing a mineral-based industry in Perak should have a multiplier effect on the E&E sector since it is one of the main users of mineral-based products.

Figure 3.15: Contribution of Mineral-based Industry to Perak's GDP



Source: DOSM State GDP Table, 2015-2020

Another reason the mineral-based industry should be given a greater emphasis in Perak is that it has been able to attract collectively an average realized investment of RM149 mill per year, contributed by non-metallic minerals (RM 74 mill), fabricated metal products (RM58 mill) and basic metal products (RM17 mill). As shown in Figure 3.16, the investment values put the mineral-based industry as a significant contributor as the services sector (RM143 mill) to the development of the Perak economy. That contribution accounts for 16.5% of the average yearly realized investment of RM904 mill. The State has to design sustainable strategies to ensure the existing companies remain while attracting new ones. In line with the national plans (TIM 2021-2030 Plan), Perak should develop strategies that will attract global industry players into the industry, not only because this is the main attraction to foreign direct investment, but also the strategy to obtain knowledge and technology transfers.

Figure 3.16: Realized Investment in Perak by Industry, 2000 – 2019

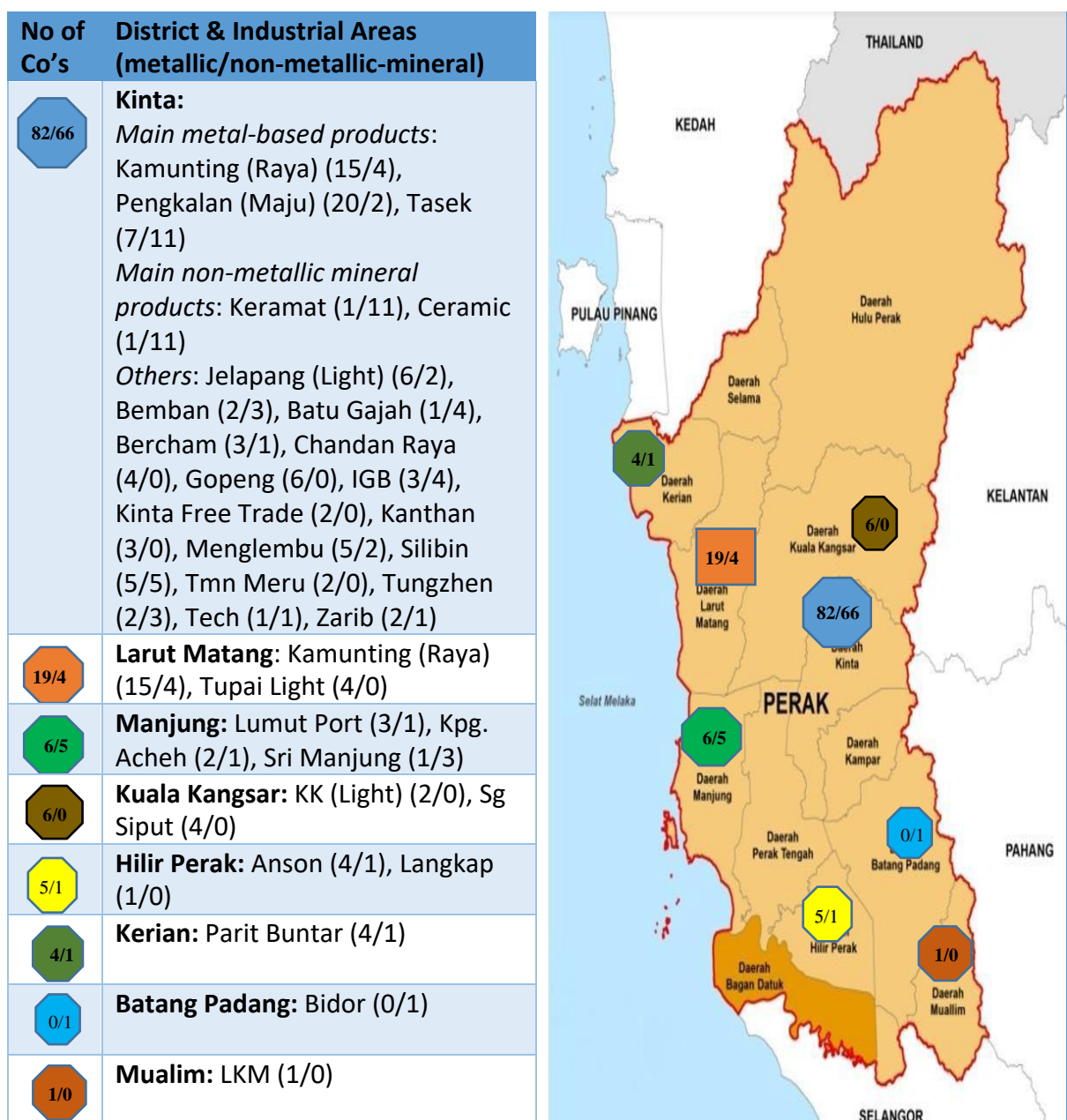
There are several issues that must be considered in planning the expansion of mineral-based industry in Perak *via* the participation of international industry players:

1. Providing industrial areas that provide strategic access to land and sea transportations
2. Availability of high-tech skilled talents to meet the industry demand, and
3. Availability of 5G high-speed broadband (HSBB) infrastructures to enable adoption of Industry 4.0 technologies and remote working culture.

Identifying a strategic location is one of the main issues that need to be considered in Perak since currently, mineral-based industries are concentrated in the Kinta district. Based on a Google Map search conducted on companies located at 43 (of 70) industrial parks in Perak, Kinta houses 70% of mineral-based companies. As shown in Figure 3.17, the main concentrated areas for mineral-based companies are Pengkalan and Pengkalan Maju, Kamunting and Kamunting Raya, and Tasek industrial parks. Expanding the mineral-based industry at these industrial parks might not be effective and efficient because these parks are

among the largest and heavily populated. Pengkalan and Pengkalan Maju industrial parks already house more than 50 companies, Kamunting and Kamunting Raya have more than 60 companies, and Tasek industrial park house about 40 companies.

Figure 3.17: Distribution of Mineral-based Industry in Perak



Source: Author's Google Map search

Another issue with developing mineral-based industry in the Kinta district is due to the saturation of the area. The Google Map search detects 21 industrial parks, which house 464

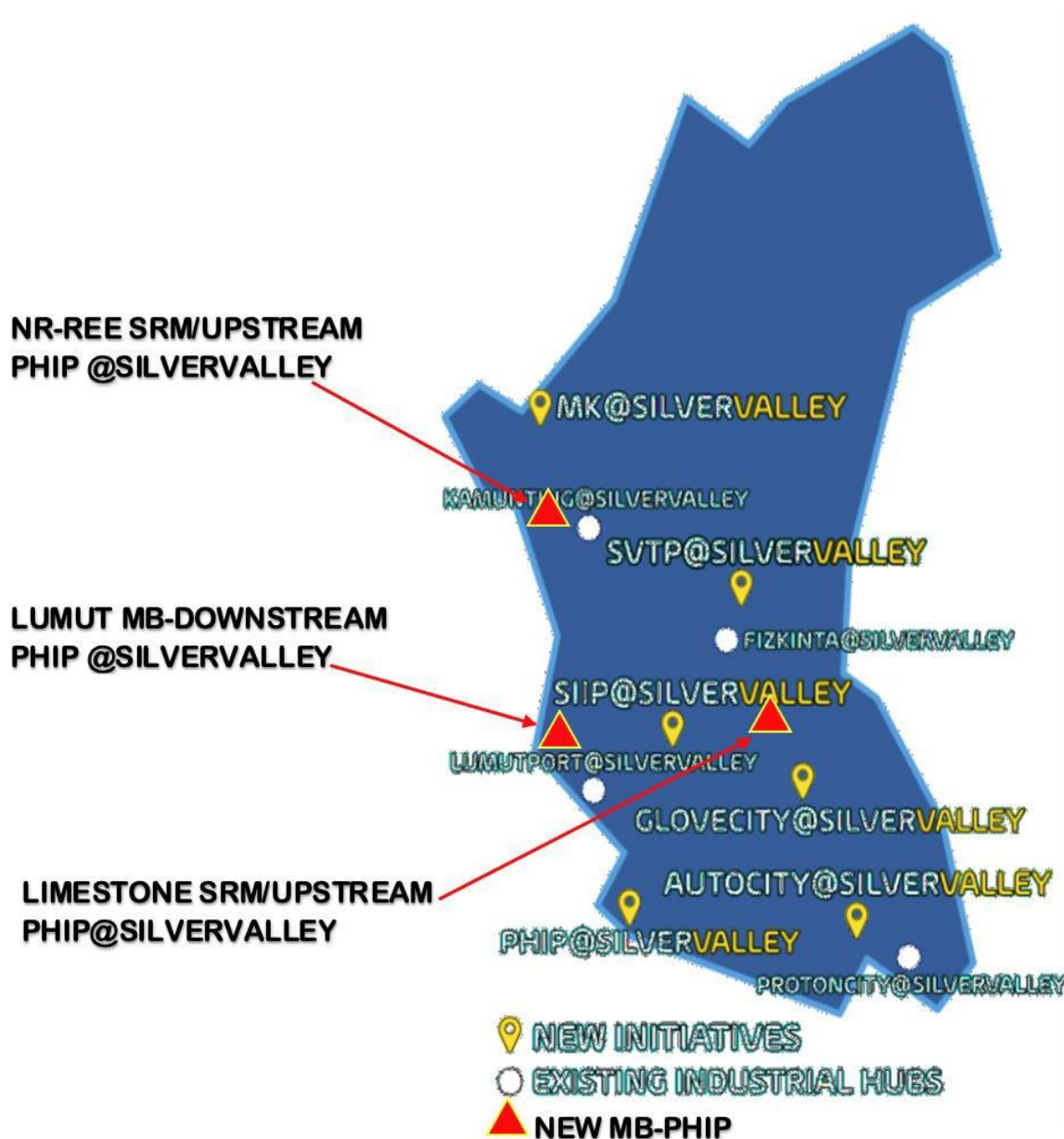
companies. There are apparently many more companies that are set up outside of the industrial areas. In the Dun & Bradstreet database, there are 90 metal ores and 220 mineral ores mining and quarrying activities registered in the area of Ipoh. Soon, the Kinta district will be more crowded with the development of Silver Valley Technology Park (SVTP) at Kanthan. To promote inclusiveness in the State economy, the government should focus on developing other areas which also have potential in the mineral-based industries.

3.8.2 Potential for establishment of New PHIP

As one of the largest minerals producers in Malaysia, Perak has a great potential to create and realize greater economic advantages from its minerals by revitalizing its mineral-based industries. The strategies to revitalize the industries are through greater global industry players' participation, promotion of Lumut Port as the regional transshipment hub, and deployment of Industry 4.0 technologies. Several strategies can be implemented to realize this vision. Figure 3.18 below illustrates the latest flagship projects that are parked under the Silver Valley brand. 1) MK Land at Lembah Beriah, Kerian, 2) Perak Heavy Industry (PHIP) at Bagan Datok, 3) Autocity near Slim River, 4) SVTP at Kanthan, 5) Seri Iskandar Industrial Park (SIIP), and 6) Glovecity at Bidor. None of these new projects is targeted for the mineral-based industries, despite the potential contribution of these industries to Perak's economy.

The UKM Pakarunding has identified three locations that would offer strategic advantages for the development of mineral-based industries. The objective of the plan is to promote downstream products to make Perak's mineral-based products more competitive at the global markets, allowing the industries and the State to realize higher values from the industries. That plan does not discredit the importance of the upstream and immediate mineral-based products, which have also contributed significantly to the State's economy. Indeed, it also includes mining and quarrying activities within the sustainable and responsible mining (SRM) model since there are vast underexplored areas in Perak that are rich. Two mineral-based industrial parks for SRM and upstream industries are recommended in areas identified as rich with high-quality and highly sought mineral deposits: Simpang Pulai (Sungai Raia) and Kenering, Gerik. The emphasis on developing upstream industries in these areas is to produce higher values from the mineral deposits extracted in the State.

Figure 3.18: Perak Silver Valley Road Map with Mineral-Based Industries Initiatives



Source: InvestPerak and author's projection.

As denoted with the red triangle in Figure 3.18, two of the three industrial areas identified for SRM plus upstream mineral-based industries will be located in Kenering, Gerik and Simpang Pulai, Sungai Raia. These areas will be targeted for industry players that are capable of developing upstream industries from large-scale mining or quarrying of non-radioactive rare earth elements (NR-REE) in the form of lanthanide and limestone, respectively. The State

should maintain the mining activities at Pengkalan Hulu at the current rate. The area has a large tin deposits surrounding Batu Klian, which partly has been awarded to Rahman Hydraulic Tin Min Ore. Tin deposits have also been found at other nearby areas such as Sungai Pong and Sungai Pahit, but mining in those areas must be done in a strategic manner and extra monitoring since Pengkalan Hulu is also the source of water supply for the State.

The main agenda of realizing greater values from the mineral-based industries is through developing the immediate and downstream products. In identifying the strategic location for this downstream mineral-based industrial park, the Kinta district will no longer need to be considered. As explained earlier, the Kinta area is already saturated and developed. There are several factors that must be considered in determining the areas to develop the mineral-based industries. First, given the nature of mineral-based materials and products, the area must have access to sea and land transportation that allow local and overseas transshipment between companies and suppliers and buyers. As shown earlier, Perak's mineral based industries have been extensively internationalized. This trend is expected to increase since the development of the industry will involve international players. This second factor, which involves global player considerations, is critical to Perak due to several reasons. Besides FDI and knowledge and technology transfer, the global industry players are the catalysts for Perak's mineral-based companies to penetrate the global markets, beyond ASEAN.

The third factor is promoting inclusivity in the whole of Perak. As illustrated in Figure 3.18, there are several areas in Perak that are lacking development activities and whose natural resources are underutilized. Perak has large deposits of monazite sand and xenotime which contain high-value and highly-sought REE rare earth elements (HREE). HREE are highly-sought for its uses in technological applications from smartphones, tablets, computer monitors and plasma televisions to rechargeable batteries and magnetic resonance imaging machines. The HREE contains 17 elements, i.e., 15 elements in Lanthanide, scandium and yttrium). However, extracting REE must be done according to its standard of practice (SOP) because some REEs contain radioactive elements that impose serious health risks to the surrounding population and workers. Monazite contains high thorium (radioactive) element and thus recommended

for exports. Meanwhile, xenotime is non-radioactive and thus, should be chemically processed locally and use in local downstream industries.

Perak government has implemented a mineral excavation policy that ensure the mining and quarrying activities abide with the sustainable and responsible mining (SRM). Following the SOP of NR-REE mining (2022), mineral excavation is to be conducted in large-scale mining projects. Inclusivity, large-scale mining, and SRM are the main factors leading to the selection of Kenering at Gerik and Simpang Pulai as their locations for new initiatives to develop mineral-based industries. As shown in Figure 3.19, a large area of non-radioactive rare earth elements (NR-REE) has been identified at Kenering of Gerik district. Two of those minerals have been identified:

- 1) Non-radioactive rare earth elements (NR-REE) in Mukim Kenering, Gerik.
- 2) Limestone in Simpang Pulai, Mukim Sungai Raia.

A large-scale mining can be done at Kenering as it has a large part of the total estimated NR-REE deposits (1,687,500 tonnes) in Hulu Perak. In addition, UKM Pakarunding proposes that investors to these industrial parks must be selected among those that are capable of mining and quarrying the high-quality minerals AND creating their upstream potential.

For the high-tech PHIP targeted for downstream products, the best strategic location would be the area within Lumut Maritime Industrial Cities (LuMIC) within the greater LMT development plan. Lumut is chosen given the nature of mineral-based industries that involve heavy and bulky products, which means the most critical factor to the industries is the access to land and sea transportation. Perak used to have seaports that aren't accessible by international vessels. However, Lumut has the advantage of its strategic location and has been developed to be the transshipment hub of South East Asia. Therefore, a PHIP in LuMIC offers the most strategic location to promote the production of downstream products among global industry players. The participation of local industry players in this area, especially among SMEs in the alliances is key to technology transfers.

Figure 3.19 Areas identified with NR-REE and limestone deposits



Source: Energy and Natural resources (ENR), MB Inc.

3.8.3 Implementation Strategy

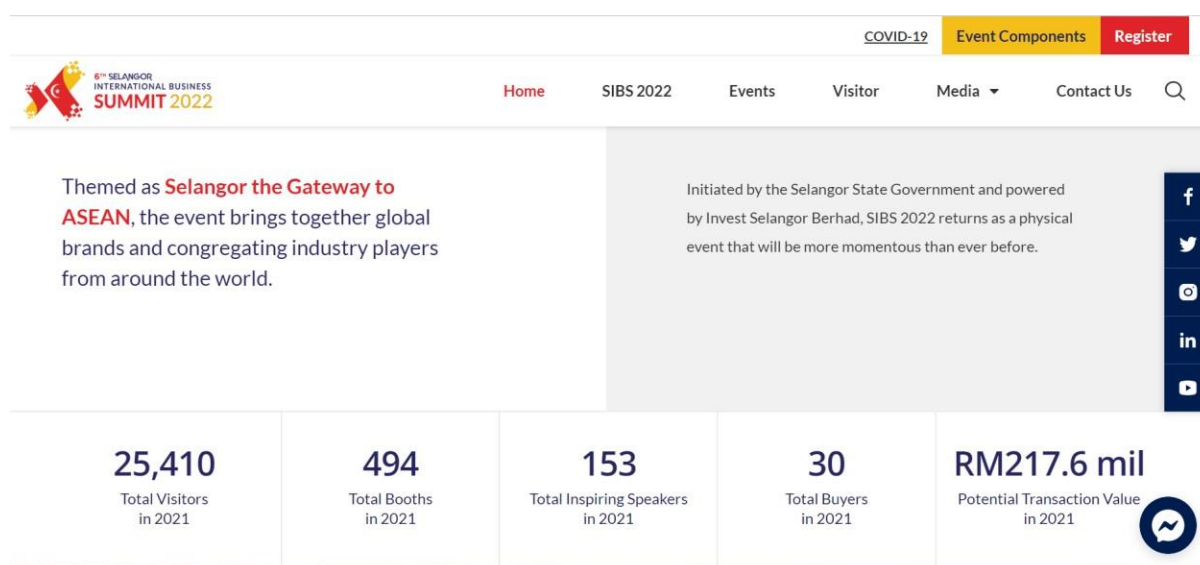
3.8.3.1 Promoting the production of mineral-based downstream products to local industry players.

The objective of this strategy is to increase the production of mineral-based products by 7% CAGR per annum. Based on the forecast by the Business Research Company (BRC), the global metal and mineral market is expected to grow from USD6320.71 billion in 2020 to USD6937.72 billion in 2021, at a compound annual growth rate (CAGR) of 9.8%. The growth is mainly due to the companies rearranging their operations and recovering from the COVID-19 impact, which had earlier led to restrictive containment measures involving social distancing, remote working, and the closure of commercial activities that resulted in operational challenges. The market is expected to reach USD9021.86 billion in 2025 at a CAGR of 7%. This growth rate can be considered moderately conservative since the mineral industry has been contributing on average 6% to the State's GDP (refer to Figure 3.15) for the past few years.

This objective will be achieved through three strategies; 1) Involving global industry players, 2) Improving transport infrastructure and ICT connectivity in high-impact industry areas via private-public partnerships, and 3) Promoting the adoption of Industry 4.0 technologies to improve production efficiency and enhance productivity in the medium and long terms, consistent with the goal of the 12th Malaysia Plan (12MP). These strategies correspond to the main strategies laid out in the TIM 2021-2030 Plan, in which international cooperation will be explored to facilitate technology transfers and foreign investment (FDI) in the mineral subsector and mineral-based manufacturing subsector. They also support the prerequisite in attracting global industry players suggested under Strategy D Priority Area of the 12MP. The strategy suggests that the role of industrial areas must be enhanced by improving their attractiveness and investments. Consistent with many national plans, the involvement of global industry players is critical in developing the downstream mineral-based industries. In the case of Perak, participation by global players can be leveraged for both upstream and downstream products, including through merger and acquisition (M&A). These initiatives will attract FDI and accommodate technology transfer to local players (TIM 2021-2030 Plan).

Therefore, the first quick-win program to attract global industry layers is by increasing promotional activities at international stages. At the state level, Perak needs to reactivate and rebrand its promotional platform i.e., the Pangkor International Development Dialogue (PIDDD) which had become a brand since its commencement in 2012. It is also more inclusive for PIDDD to be rebranded as Perak International Business Development Dialogue (PIBDD) to clearly establish its state-wide coverage and its business (industry and service) orientation. It is also more appropriate since PIDDD had been organized in various parts of the State, instead of just Pangkor. In addition, more foreign business-driven campaigns should be initiated to allow the respective lead agencies and their strategic business partners to promote industries in their areas to the global industry players and at the same time, invite local companies to showcase their products. Figure 3.20 shows an initiative to call for participation from business leaders by the Selangor in October 2022.

Figure 3.20 6th Selangor International Business Summit



Source: <https://selangorsummit.com/>

More aggressive goal-oriented attempts must be made by joining international business campaigns. In Tables 3.8 and 3.9, there are lists of major industry players in the immediate and downstream of metallic and non-metallic mineral industries.

Table 3.8: Major global players in metal-based industries

Sub-Industry	Major Global Industry Players
Primary Metals Industry	Alcoa, Nucor, and US Steel (all based in the US), along with ArcelorMittal (Luxembourg), China Baowu Steel Group, China Hongqiao Group, Jiangxi Copper Company (China), Nippon Steel & Sumitomo Metal and JFE (Japan), POSCO (South Korea), Rio Tinto Alcan (Canada), Rusal (Russia), Tata Steel (India), and ThyssenKrupp (Germany).
Steel Production Industry	Nucor and United States Steel (both of the US), as well as ArcelorMittal (Luxembourg); China Baowu Steel Group and HBIS Group (both of China); JFE and Nippon Steel & Sumitomo Metal (both of Japan), POSCO (South Korea), Tata Steel (India), and ThyssenKrupp (Germany).
Aluminium Production Industry	US-based Alcoa and Aleris, along with Aluminum Corporation of China; Hindalco Industries (India); Norsk Hydro (Norway); Rio Tinto (the UK and Australia); and RUSAL (Russia)
Architectural & Structural Metals Industry	Gibraltar Industries, NCI Building Systems, and Valmont Industries (all based in the US), as well as units of integrated metal producers such as Arconic, Nucor, and US Steel (US); ArcelorMittal (Luxembourg); JFE Holdings and Nippon Steel & Sumitomo Metal (Japan); HBIS Group (China); and Tata Steel (India).
Metal Coating, Engraving & Heat Treating Industry	AZZ, Precoat Metals (a division of Sequa), Pro-Tec, and the coatings division of Valmont Industries (all based in the US), along with Bodycote (UK), and the heat treating division of DOWA Holdings (Japan).
Metal Valve & Pipe Fitting Industry	Curtiss-Wright, Emerson Electric, Flowserve, and Parker Hannifin (all based in the US), as well as valve manufacturers such as Crane, Mueller Water Products, and Watts Water (all based in the US), and IMI (UK), Kitz (Japan), KSB (Germany), and Tianjin Dazhan Group (China).
Metalworking Machinery Industry	Hardinge, Hurco, and Kennametal (all based in the US), along with Amada (Japan), DMG Mori (Japan), Fives (France), Shenyang Machine Tool (China), and TRUMPF (Germany).
Fabricated Metal Product Industry	Ball Corporation, Flowserve, Gibraltar Industries, Mueller Industries, Snap-On, The Timken Company, Valmont Industries (all headquartered in the US), Jiangsu Guotai International (China), Schaeffler Technologies (Germany), and Toyo Seikan (Japan).

Source: Dun & Bradstreet company database

Table 3.9: Major industry players in Non-Metallic Mineral Industry

Sub-Industries	Major Global Industry Players
Abrasives Industry	3M (US), Henan Huanghe Whirlwind (China), Noritake (Japan), Saint-Gobain (France), and Tyrolit (Austria).
Asphalt Products Industry	Owens Corning, Carlisle, and CertainTeed; segments of large aggregate companies such as CRH (Ireland), Lafarge North America, and Vulcan Materials; and segments of large refined petroleum product companies such as BP, Marathon Petroleum, and Valero.
Cement & Concrete Product Industry	Ash Grove Cement Company, Martin Marietta Materials, US Concrete, and Vulcan Materials (all based in the US), as well as Anhui Conch (China), Cemex (Mexico), CRH (Ireland), HeidelbergCement (Germany), and LafargeHolcim (Switzerland).
Clay Product & Refractory Industry	Dal-Tile, Gerber Plumbing Fixtures, and Kohler (all of the US) as well as Kyocera, Shinagawa Refractories, and TOTO (all of Japan), Interceramic (Mexico), RHI (Austria), and Vesuvius (UK).
Glass & Glass Product Industry	Corning, Guardian Industries, and Owens-Illinois (all based in the US) as well as Asahi Glass (Japan), Compagnie de Saint-Gobain (France), Fuyao Glass Industry Group (China), and SCHOTT (Germany).
Non-metallic Mineral Product Industry	3M, Ash Grove Cement Company, Guardian Industries, Kohler, and USG Corporation (all based in the US), as well as Asahi Glass and Noritake (both of Japan), Compagnie de Saint-Gobain (France), LafargeHolcim (Switzerland), and RHI Magnesita (the Netherlands).

Source: Dun & Bradstreet company database

In identifying global industry players that should be targeted for the business development campaigns and activities, Perak should not shy away from the biggest industry players in the world. These companies typically have facilities in a large of countries, partly to reduce the costs of transporting their products to the local markets. In Table 3.10, we list from among the top 5 companies in each sub-industry that have already set up their facilities in Malaysia, but not in Perak.

Table 3.10: Major industry players with facilities in Malaysia

Sub-Industry	Company description	Branch in Malaysia
Metal fabrication Industry	DMG Mori (Aktiengesellschaft) – A Germany-based company is a leading manufacturer of machine tools and metal fabrication equipment worldwide. The company continues developing and promoting the software solution CELOS, a control and technology-independent system that supports interaction between machines and its operators.	DMG Mori Malaysia Sdn Bhd, in Shah Alam, Selangor.
	Yamazaki Mazak– A Japanese MNC that has a global presence in the UK, US, and Russia under the name of Mazak. It is a leading manufacturer of advanced technology solutions including Multi-Tasking, Hybrid Multi-Tasking, 5-axis, milling, turning, CNC controls, Laser Processing machines, and automation.	Yamahazaki Mazak Malaysia in Serdang, Selangor.
Basic Metal Industry	Sandvik (Materials Technology) AB – Sweden-based Sandvik company is a high-tech and global engineering that manufactures metal- cutting tools and tooling systems, mining and rock excavation equipment and tools, stainless steel, special alloys and titanium, additive manufacturing, furnace products, and heating systems.	Sandvik South East Asia Pte Ltd has been working with Petronas under various oil-based projects.
	Ametek is an American-based leading global manufacturer of electronic instruments and electromechanical devices with annual sales of approximately 5.1 billion USD for 2019. It has 36 out of 63 plants outside the US.	Ametek Engineered Materials Sdn Bhd at Bayan Lepas, Penang
	ArcelorMittal - A Luxembourg-based steel manufacturing company.	ArcelorMittal International Malaysia Sdn Bhd has been established in 1997 in KL
Non-metallic Mineral Industry	BASF SE – It is an American-based company that offers six product segments: Chemicals, Materials, Industrial Solutions, Surface Technologies, Nutrition & Care, and Agricultural Solutions.	BASF (Malaysia) Sdn Bhd since 1989, located at Bukit Jelutong and Bukit Raja, Selangor and Pasir Gudang, Johor, as well as an operational site in Kulim, Kedah.
	3M – The American-based company produces innovative roofing granules the sustainable solutions	3M Malaysia has been established in Malaysia

	to homeowners, manufacturers, and contractors. Their speciality granules offer unique performance features for asphalt shingles, stone-coated metal, and low-slope cap sheets that can reduce the urban heat island effect and pollution in smog-ridden cities.	since 1967 and its facilities are located in Ara Damansara, Bayan Lepas Penang and Bukit Jelutong Selangor.
	Guardian Industries – A US-based company is one of the world’s largest manufacturers of float, value-added and fabricated glass products and solutions. At our 25 float plants located around the globe, Guardian Glass produces high-performance glass for architectural, residential, interior, transportation, and technical glass applications. It has 29 global branches.	Guardian Industries Malaysia Sdn Bhd (probably in dormant status) which is located in Jasin, Melaka (24 hectares, palm oil plantation from the Melaka state)
	Kohler Co. – A US-based company that produces high-end plumbing fixtures, tile, furniture and cabinetry, engines, and generators.	Kohler Malaysia Sdn Bhd has 3 showrooms in Selangor (2 in PJ, Klang) and 1 in KL

Source: Author’s search

UKM Pakarunding proposes a state-of-the-art PHIP for a mineral-based downstream industrial park at Lumut Industrial Cities at either LuMIC1 or LuMIC4 (most ideal) as the second quick win. The LuMIC web comprises:

1. LuMIC1 is an operating plan in Kampung Acheh, situated next to the LMT (197 acres terminal including more than 100 acres of container yard), the fully-occupied LPIP and in the plan of developing a new 150-acres industrial area.
2. LuMIC2 at Teluk Siangin is plan for tank farm, O&G and petrochemical.
3. LuMIC3 is at Damar Laut is planned for bulk transshipment, multipurpose cargo, processing industry and 1200 acres industrial park (some forest reserve).
4. LuMIC4 is strategically located within in-progress LMT2 and planned LMT3 projects with LPIP2 - 316.6 hectares/782.3 acres industrial area (mostly are State or GLC owned lands).
5. LuMIC5 will be developed as a commercial area in the Lumut town.

We believe that Lumut should be leveraged as the new center for mineral-based downstream industries in Perak since it provides a direct access to Lumut Port facilities, the infrastructure most needed by mineral industry players such as the Malaysia Smelting Corporation (MSC). This third-largest manufacturer of tin-based products is the parent company of Rahman Hydraulic which has operated a tin ore mine at Klian Intan, Hulu Perak since 1907. The mining company has carried out the largest mining activities of hard rock tin ore in Malaysia. MSC exploits the tin ore materials from Pengkalan Hulu but transports the materials to Butterworth, Penang for downstream production. This modus operandi is a huge loss to Perak, not just from the income taxes from higher-value products, but also employment opportunities and spillover effects to the nearby areas. However, MSC would have borne very high costs to run the downstream production in Pengkalan Hulu because it requires other materials that will have to be transported to Pengkalan Hulu and then transported back in the forms of finished products. Relative to Penang, MSC is likely to face bigger challenges in getting skilled talents and living environment in Pengkalan Hulu.

3.8.3.2 Upgrading transport infrastructure and ICT connectivity in high-impact industry areas via a private-public partnership

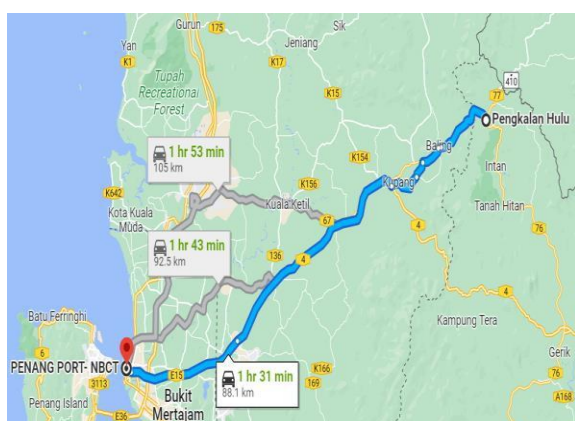
Land and sea transportations are the basic infrastructures for mineral-based industries since their materials and products are bulky and heavy, and the trade involves international partners. Consistent with Policy Enabler #3 of the 12MP, Perak needs to upgrade the road infrastructure in remote areas along the stretch between Lumut Port and the established and potential mineral-based industrial areas at Pengkalan Hulu, Simpang Pulai and Gerik to better attract local and global investors into the areas, and facilitate exports of the productions. The program can be funded with allocation for a program such as Initiative 1: Development Projects for Recovery #230 of the Budget2022, which allocated RM2.9 billion, among others, for road maintenance projects. The projects are under the supervision of the Public-Private Partnership Unit (PPPU), Prime Minister's Office.

The transportation upgradation strategy is expected to improve transport infrastructure and ICT interconnectivity throughout Perak. For the three proposed industrial areas, those to be set up in Gerik and Sungai Raia are for mining and quarrying and basic upstream products.

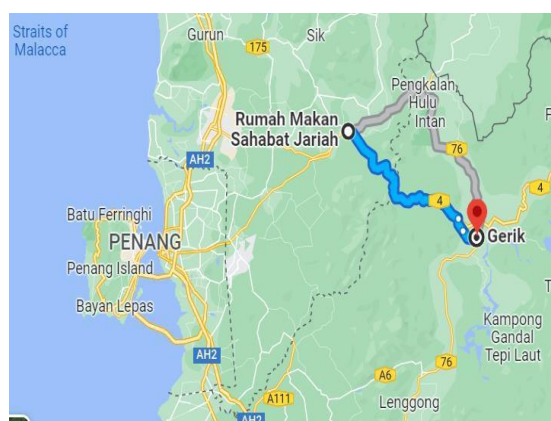
Attracting global industry players (or even local players) would require some investment particularly in ensuring the industries have access to land and sea transportation. For the industrial area in Gerik, the more cost-efficient sea transportation would be via Penang Port. However, Penang Port is congested and Perak needs to start positioning Lumut Port to develop the areas and reduce income leakages from the State mineral resources. The road stretch to Lumut Port from Kenering Gerik should be extended to Pengkalan Hulu to ensure minerals excavated from the areas can be processed in Perak. The total road upgrade will be done on the 300km stretches (refer to Figure 3.21):

1. 226km: The stretches from Pengkalan Hulu to Kenering to Lumut Port.
2. 79km: Stretch from Simpang Pulai to Lumut Port.

Figure 3.21. Distance between Pengkalan Hulu and Gerik to Penang Port



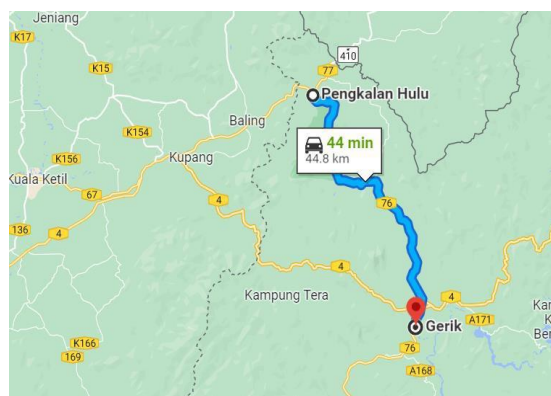
Pengkalan Hulu/Gerik -> Kupang -> Penang Port



Gerik to Kedah Border at Kupang



Pengkalan Hulu to Kedah border at Baling



Gerik to Pengkalan Hulu

For access to sea transportation, Lumut is the most suitable port to be developed. Lumut offers a shorter distance from many areas in Perak, compared to Penang Port and Klang Port. Designing the plan for Lumut Port facilities would be the **second quick win** for Perak. To attract these global industry players, Perak has to be able to offer an international seaport of close proximity to the industrial parks so that it competes with Penang and Selangor. As suggested above, a high-tech PHIP industrial area in Lumut/Sri Manjung/Setiawan area will be developed to accommodate downstream mineral-based products within close proximity to Lumut Ports. The quick win program is designing the plan that includes Lumut Ports and high-tech PHIP. The promotion of Lumut Port should comprise:

- Lumut Port Maritime Terminal (Lumut Port) – largest dry-bulk unloading facility among South-East Asia with a capacity of more than 1 million TEUs per year. This capacity is sufficient to handle containers from most industrial parks (eg., PHIPs in the Kinta district, Kamunting Raya, Batu Gajah, Cederiang and Muallim).
- Lumut Port 2, completed 1st phase and progressing with the 2nd and 3rd phases to be launched in 2023, will be equipped with sophisticated operation and maintenance systems and other competitive services designed to enhance capacity and productivity.
- Lumut Port 3 is in the LMT Development Plan.

With its strength in the mineral mining industry, Perak is also in a good position to involve Malaysia Mining Corporation (MMC Group) in this program. Private-public partner is key in this program since it has been successfully implemented in developing the existing Lumut Port facilities. The existing Lumut Ports are operated by Vale (M) and Tenaga Nasional Berhad (TNB Manjung), but MMC Group is the major owner of many major ports in Malaysia. This program can be proposed under the Development Projects for Recovery #230 of the **B2022**, which has a total budget of RM200 mill to boost high-impact infrastructure development activities. The projects are under the supervision of the Public-Private Partnership Unit (PPPU), Prime Minister's Office. Perak should promote Lumut Port globally since infrastructure support is required to attract more quality investment.

In addition to land and sea transportation, the fast and secure data connection is a basic requirement for the adoption of Industry 4.0 technologies and attracting global industry players. Malaysia has already deployed High-Speed Broadband (HSBB) and 5G technologies on a widespread basis. However, the statistics for Perak (MCMC, 2021) showed that premises in the State have very low (<40%) broadband internet access and are most likely on 4G, which may not support the adoption and development of Industry 4.0 technologies and processes. Perak can take advantage of Digital Nasional Berhad (DNB) under 12MP which is established to accelerate the provision of 5G coverage. The project can also enhance the attractiveness of the industrial areas, to bring more investments (Strategy D Priority Area of the 12MP). Based on Perak's JENDELA plan, there are excess allocations of 90,979 premises in Perak that will be equipped with fibre optic. This intervention program aims to systematically address and remove key connectivity bottlenecks in priority locations and eliminate disruption in ICT connectivity needed for the globalized working environment in the pandemic and its aftermath.

To cater to the need of remote working in the new norms and to enable the adoption of Industry 4.0 technologies, the ***third quick-win*** program involves identifying tech-based industrial parks in Perak and setting up the facilities for High-Speed Broadband (HSBB) and 5G technologies in those areas before gradually providing these facilities on a widespread basis. This facility is also imperative to attract global industry players to Perak since they are typically using these advanced technologies.

3.8.3.3 Creating a pool of high-tech skilled talents and upskill with Industry 4.0 technologies, digitalization, and niche capabilities

This strategy is expected to increase GDP per capita by 1.14% per annum via high skilled STEM and TVET job opportunities in mineral-based industries. In line with the National Fourth Industrial Revolution (4IR) Policy and the Malaysia Digital Economy Blueprint, Perak should move forward with Malaysia in building its economic resiliency and competitiveness by leveraging advanced technology adoption, digitalization, and niche capabilities. Although the mineral-based industry is not classified as the strategic and high-impact industry in the 12MP, it has been the main contributor to the economy's GDP. Perak needs to keep abreast with

the transformation since global industry players have been leveraging on the Industry 4.0 technologies.

In its efforts to attract global players into Perak, the target should be on those companies that have embraced IR4.0 technologies to improve the efficiency and productivity of their production. Global industry players have been leveraging on the Industry 4.0 technologies. For instance; **BASF SE**, one of the top 5 global basic metal companies use digital technologies and data to create additional value for our customers and increase the efficiency and effectiveness of our processes. Manufacturers of non-metallic mineral products adopt AI to reduce equipment downtime, spot production defects, improve supply chains, and shorten design timelines.

In Perak, the technologies are most needed for the downstream mineral-based products. The program should be aimed at obtaining technology transfer from the global players, empowering Perak's mineral-based industries, and creating their competitiveness in global markets. The report cited the survey results of Boston Consulting Group (BCG) in 2015, 1.2 mill industrial robots are expected to be deployed by 2025, thus indicating a rise in automation and robotics technology adoption to improve productivity and reduce production costs. According to the KPMG report, 16% of executives of global metals companies have already invested in robotics for metal manufacturing, 31% of executives have set plans to possibly invest in robotics for new technology and opportunities, and 42% are willing to invest in robotics in the near future. Additionally, the report states, 63% of the executives of metal manufacturing companies are considering investing in automation. Examples of companies offering industrial robots to metals companies include Fuji Automated Numerical Control (FANUC), KUKA AG, ABB Robotics, and Yaskawa Motoman.

Perak has been facing a brain drain but a shortage of high-tech skilled workers is a problem across the globe. Developing a pool of high-tech skilled workers is necessary but will take time. Therefore, to build its economic resiliency and competitiveness by leveraging advanced technology adoption, digitalization and niche capabilities, the State needs global industry players to transfer technology and knowledge from their own talents to the local workforce.

To cater for the needs of high-tech global companies, Perak may need to encourage the recruitment of expatriates from countries producing low-cost high-tech skilled employees like India. Future high-tech skilled talents need to be cultivated by increasing high-tech courses in the respective TVET colleges. The State should also offer factors that attract migration, i.e., comfortable areas and environments that offer safety and affordability relative to metropolitan cities.

Besides economic benefits, the cultural need is an important consideration for foreign investors that cherish social networks. Japanese companies are known for their “keiretsu” culture and the presence of other Japanese companies has a positive influence on where they choose to locate their plants. For this purpose, a website such as Asean.jp (https://www.asean.or.jp/ja/invest/country_info) is created to record Japanese companies that are located in industrial parks. The website has a list of industrial parks in Malaysia, including 31 of those in Perak. An effort that seems trivial could be the first place that foreign investors would prefer to look at to identify where they should locate their plants. A comprehensive or one-stop-centre list of industrial parks published by the Perak state’s agencies would be considered more credible and thus, likely to entice FDI interests and company relocation to Perak. A **fourth win program** would be to develop a company database, listing the company’s details and park it under InvestPerak or one its wing. The UKM Team has initiated the simpler version of such a database ..\ABOUT DATA\COMPANIES AT INDUSTRIAL PARKS IN PERAK.xlsx

3.8.3.4 Intervention Programs for Strategies

There are altogether 9 intervention programs that have been proposed to implement the plan to develop mineral-based industries in Perak.

1. Forge an alliance with major global players in SRM/upstream and downstream products, including through M&A, to attract FDI and accommodate technology transfer to local players (TIM 2021-2030 Plan).
2. Position the 2nd PHIP@Silvervalley in Lumut for downstream mineral-based industries
3. Develop 2 industrial areas for SRM plus upstream industries: 1) NR-REE at Kenering, Gerik and 2) limestone at Sungai Raia, Simpang Pulau.

4. Upgrade land connection from remote/rural areas with SRM and upstream industry potential (Pengkalan Hulu through kenering, Gerik and Simpang Pulai to Lumut Port)
5. Empower Lumut Maritime Port Sdn Bhd (LMT) to accelerate the development of Lumut Port System with LMT 2 and LMT 3 to accommodate increases in international vessels
6. Improve internet access in industrial areas to facilitate remote working in the new norms and adoption of I4.0 tech.
7. Attract high-skilled, high-tech talents back to Perak to support the development of downstream product industries
8. Encourage recruitment of high-skilled talents from global industry players and foreign countries.
9. Provide tax incentives for companies to train workers with digital technologies aimed at improving productivity

4.5 Estimated Costs

The costs of developing the programs to implement the strategies are provided below.

Intervention Programs	Estimated Costs	Lead Agencies
Initiative 1 Forge alliances in SRM/upstream with major global players in upstream and downstream products, including through M&A, to attract FDI and accommodate technology transfer to local players (TIM 2021-2030 Plan).	RM7 mill Reactivate and rebrand Pangkor Int'l Development Dialogue (PIDD) to Perak International Business Development Dialogue (PIBDD) to be organized at least twice until 2023 ¹	Invest Perak, ENR (MBI), LMT and PKNP (developer)
	Organize government-to-business (G2B) talks, targeting global industry players in Malaysia.	Invest Perak, ENR (MBI), LMT and PKNP (developer)
	Active participation in overseas business campaigns	Invest Perak, ENR (MBI), LMT and PKNP (developer)
Initiative 2 Position the 2nd PHIP@Silvervalley for downstream mineral-based industries in the LuMIC Industrial Area	RM8 million Identify and recruit global industry players and participate in Perak direct investment campaigns	LMT/Invest Perak
	LPIP2 area is 150 acres Offered in 15 lots of 10 acres to foreign & local investors @RM49sqft ² Price per lot = RM21,344,400/10 acres Total area = 150 acres = 6,535,000 sqft	LMT & IP and MB Inc.

	Develop the PHIP with world-class infrastructure including the HSBB and 5G networks @RM0.5 mill/lot (1 lot ~ 10 acres)	LMT & MCMC
Initiative 3 Develop two industrial areas for SRM and upstream industries for 1) NR-REE at Kenering, Gerik and 2) limestone at Simpang Pulai, Sungai Raia	RM10 million Establish the NR-REE industrial area for SRM and upstream industries on 578.957 hectares land in Mukim Kenering, Gerik, 5 companies @100hectares/lot	ENR (MB Inc)
	Establish an industrial area for SRM of Limestone and its upstream industries at Simpang Pulai, Sungai Raia. 100ac/lot	ENR and PPPNP
	Improve attractiveness of the industrial areas to attract investments - upgrade infrastructure and facilities, and improve livelihood of the nearby areas.	ENR, PPPNP, Local authorities
Initiative 4 Upgrade the land connection from remote/rural areas with industry potential (Pengkalan Hulu and Gerik) to Penang Port (for closer proximity relative to Lumut Port)	RM31 million Conduct surveyor works to determine areas that require upgrades within the 300km stretches from Pengkalan Hulu and Gerik to Lumut Port and Simpang Pulai to Lumut Port	JKR dan PEJUTA
	Upgrade the road stretches between (estimated 10% of 300km – Appendix A, @RM1mill/km considering upgrade type)	JKR, PPPU and UPEN
Initiative 5 Empower Lumut Maritime Terminal Sdn Bhd (LMT) to accelerate the elevation and expansion of Lumut Port System with LMT 2 and LMT 3 to accommodate increases in international vessels	RM10.2 million Promote Lumut Port as the bulky-cargo handler worldwide	COI
	Initiate G2B discussions to identify companies interested to invest in the project, eg., MMC	Lumut Port & COI
	Implement the private-public upgradation projects for more efficient Lumut Port System by adopting I4.0tech and processes	PPPU and Lumut Port
Initiative 6 Improve internet access in industrial areas to facilitate remote working in the new norms and I4.0tech	RM1.2 million Identify key industrial areas housing high-tech downstream product manufacturers (eg., more will be needed in LuMIC (5G) and Pengkalan Hulu and Kenering (no allocation for PH in the existing plan)	MCMC
	Implement HSBB and 5G at the industrial areas	MCMC

	Encourage the deployment of converged networks that are essential for Industry 4.0 technologies in selected IPs	Digital Perak
Initiative 7 Attract high-skilled, high-tech talents back to Perak to support the development of downstream product industries	RM5.2 mill Create special sponsorships and education loans for young talents pursuing programs in Industry 4.0 technologies, local and abroad*	Perak State Govt
	Empower PASAK to better promote high-tech skilled employment opportunities by holding job fairs outside Perak	PASAK, EHEHRC & MARA
	Introduce a “live, leisure and learn” campaign encouraging land and property developers to create a living environment that is attractive to migration to Perak	UPEN
Initiative 8 Encourage recruitment of high-tech skilled talents from global industry players and foreign countries.	RM1.2 million Identify key high-tech skills needed by the high-tech global industry players	Invest Perak
	Introduce incentives (such as tax reliefs) for high-tech global industry players to set up their facilities in Perak	IRBM/Invest Perak
	Introduce incentives (such as tax reliefs) for high-tech skilled expatriate recruitments	IRBM/Invest Perak
Initiative 9 Provide tax incentives for companies to train workers with digital technologies aimed at improving productivity	RM1.2 million Identify key industrial areas and training centres – special attention on Batu Gajah - Lumut – Gerik	MCMC
	Implementation of HSBB at the key industrial areas and training centres	FMM and HRDF
	Introduce incentives (eg., tax relief) for employers to implement compulsory training in Industry 4.0 technologies (eg., 80 hrs/year)	ADTEC, FMM & HRD Corp
Total	RM75 million	

Sources:

1. Cost of PIDD based on NCIA contribution for PIDD2015 (<https://www.thestar.com.my/metro/community/2015/02/12/rm15mil-to-support-pangkor-international-development-dialogue>).
2. Halatuju Pembangunan Perak 2040 (https://www.mbi.gov.my/sites/default/files/4_ip_strategi_jun.pdf)

3. Business Research Company (2021) The Global Metal Products Market Report
<https://www.thebusinessresearchcompany.com/report/metal-products-global-market>
4. Road upgrade cost is estimated based on the Upgrades of Jalan Tambun for a 5.2km stretch, which cost RM16.35 mill (=RM3.14 mill/km, RM8.0 from Perak State and 8.35 mill by Sunway City Ipoh. The project started on April 1 2021 and is expected to complete in Sept 2022. South China Post
(<https://www.scmp.com/country-reports/country-reports/topics/malaysia-business-report-2020/article/3052630/lumut-port>)
(<https://www.perak.gov.my/index.php/berita-utama/2176-rm16-35-mill-to-upgrade-jalan-tambun-collaboration-between-state-government-and-private-sector-10-january-2022>)
5. Pembangunan Digital Di Negeri Perak Oleh Kementerian Komunikasi Dan Multimedia
(https://rmke12.epu.gov.my/storage/fileUpload/2021/11/2021111822_slaid_slu_perak_kkmm.pdf)
6. Perak's GDP per capita needs to increase by 6% per annum to reach a high-income state status (threshold GDP per capita = RM50,140). A growth rate of 1.14% is based on a 19.1% manufacturing contribution to Perak's GDP (DOSM: Economic structure by State and sector 2020). *Allocation in addition to an existing allocation of about RM10 mill per year.
7. MyDIGITAL (2021) - Artificial Intelligence (AI) technology can increase GDP by up to 26% in the next decade

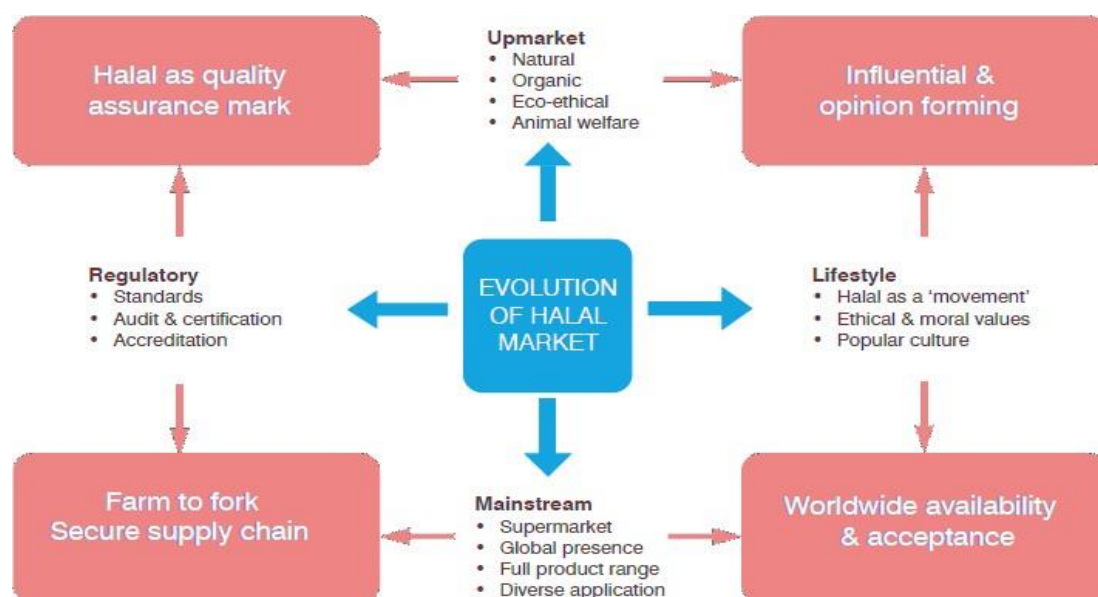
3.9 Digital Halal Hub and Bio-Technology R&D Centre

3.9.1 Background

Malaysia is the first country that regulates halal related matters and certification. In 1974 The Department of Islamic Development Malaysia (JAKIM), under the prime Minister's Office, started issuing halal certification letters for products that met JAKIM's criteria. In 1994 confirmation of halal compliance was given in the form of a certificate with a halal logo. In the absence of a globally accepted standard, Malaysia's standard for food, a documented and systematic Halal assurance system- MS1500:2009 in 2004, is regarded by many as a global benchmark, and forms the basis of many other standards. In 2006 Halal Development Corporation (HDC) was established to coordinate the overall development of the halal industry in Malaysia. Malaysia is also the first country to establish Halal-related laws with important components for an effective halal food control system including legislation, management control, inspection, laboratory and training.

The Muslims population constitutes a considerable segment in today's food market, signifies compelling opportunities on a worldwide basis as the food industry moves to a more global business model. Halal products has the potential not only for Muslims but also for Muslim countries. China, Singapore and Thailand are among countries that consider halal as a serious business opportunity. China is catching up fast of the Islamic economic trade as an outstanding player in the Halal industry. The "One Belt One Trade" initiative of China involves 28 Organisation of Islamic Cooperation (OIC) countries and stands to benefit from USD3 trillion in infrastructure-related investments (Md Siddique and Moha Asri, 2020). In this context, Halal certification has developed as a significant force in the Muslim-minority countries. In countries that export food products to the Muslim world, such as Australia, New Zealand, Brazil, the United States and European nations, halal certification has become a necessary and indeed lucrative component of international trade. These developments in Malaysia has helped to put the halal market on the international map and drew attention to the enormous market potential of the halal sectors.

Figure 3.22: Evolution of the Halal market

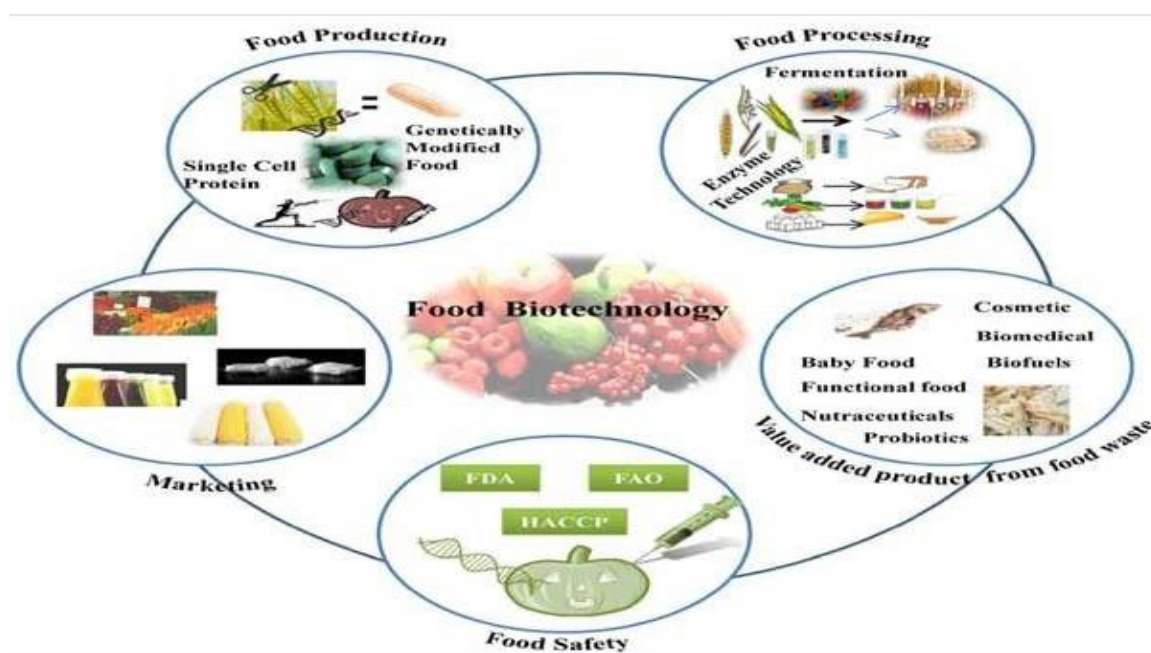


Source: ITC, 2015

Evolution of the halal market is as illustrated in Figure 3.22 above. Pertinently, biotechnology has also made significant contributions to advances science and technology as it generates tremendous economic value and national Gross National Products (GNP) which is currently dominated by the bio-pharmaceutical industry through commercialization of products and systems. Agricultural biotechnology also plays a crucial role in economic growth to sustain the competitiveness of agricultural industry and food security in Malaysia. Agricultural biotechnology is rapidly advancing providing a number of tools to improve crop production as well as smart technology. Thus, Perak needs to be part of this modern bio-technology cycle.

Biotechnology industry in Malaysia was initiated in the 1980s inspired by the rich biodiversity Malaysia has and the need to create employment opportunities and potential revenues for the population. While biotechnology can be categorised into three main sectors, namely agricultural biotechnology, medical and healthcare biotechnology, and industrial biotechnology, it is becoming increasingly difficult to create distinct categories as there is huge overlap among these sectors.

Figure 3.23: Food Biotechnology



Source: Archana Dash et al, 2016

Biotechnological interventions in food sector have been aimed at enhancing/modifying taste, aroma, shelf-life, texture and nutritional value of food products employing fermentation, enzyme technology, nanotechnology and molecular biology. The use of whole microbes as a source of nutrition and genetically modified microorganisms to be used as food or genetically modified food to address food security and malnutrition. Further, the processing techniques need to be improved along with the proper utilization of food wastes for the generation of many useful by-products (Figure 3.23).

3.9.2 Current Scenario

3.9.2.1 Halal Industry

The halal industry has its own set of challenges. Varying interpretations of religious rulings, different standards and constantly evolving regulatory frameworks can easily become obstacles. Halal is typically relative to food and beverages. Trust in halal products requires distinctness in certificates, accomplished through generally accepted standards and halal assurance systems.

The halal industry which has been identified as a strategic and high-impact sector under the 12th Malaysia Plan (12MP) would enhance Malaysia's capacity and capabilities in uplifting the development of halal talent, accelerating industry development including Bumiputera participation, increasing product competitiveness and positioning Malaysia as a global halal hub. The Halal Industry Master Plan 2030 will play a significant role in providing a bridge between entrepreneurs and industry stakeholders, uniting them under a single halal ecosystem, focusing on micro, small and medium enterprises (MSMEs). There is also potential to explore blockchain technology to address the issue of maintaining halal integrity of food products by effectively enabling tracking and traceability in food supply chains.

In Malaysia, there are various agencies that coordinate the halal and bio-technology industries as illustrated in Figure 3.24 below, each with its own portfolio to ensure smooth business processes to meet the market demand.

Figure 3.24: Organisation related to Halal & Bio-Technology Industry



Source: Google

Accordingly, national food safety and quality control, which includes food standards, food hygiene, food import and export, food advertisement, and accreditation of laboratories, is

under the jurisdiction of the Ministry of Health (MOH) Malaysia. Food Safety and Quality Division (FSQD) of MOH is responsible for protecting the public against food-related hazards and frauds, as well as motivating and promoting the preparation, handling, distribution, sale, and consumption of safe, quality food. They are also in control of the effective execution of food safety programs, which includes routine compliance, sampling, food premises inspection, food import control activities, and licensing of specified food substances required under the food law. As food safety and quality is a great part of halal food control, the role of MOH in halal food control is very important. Several government agencies are involved either directly or indirectly in halal food control. These agencies are the Ministry of International Trade and Industry (MITI), the Department of Standards Malaysia, the Department of Veterinary Services, the Royal Malaysian Customs Department, and the Local Authorities. The Veterinary Department is partly responsible for ensuring meat and meat-based products imported into Malaysia are halal certified. The Department of Standards Malaysia is responsible for developing the standard for halal food, and accrediting Conformity Assessment Bodies, such as testing laboratories, inspection bodies, and certification bodies (Borhan, 2016). The Royal Malaysian Customs focuses on the inspection of imported food items at the various ports of entry (Wahab et al., 2015).

Figure 3.25: Malaysia Halal certification procedure



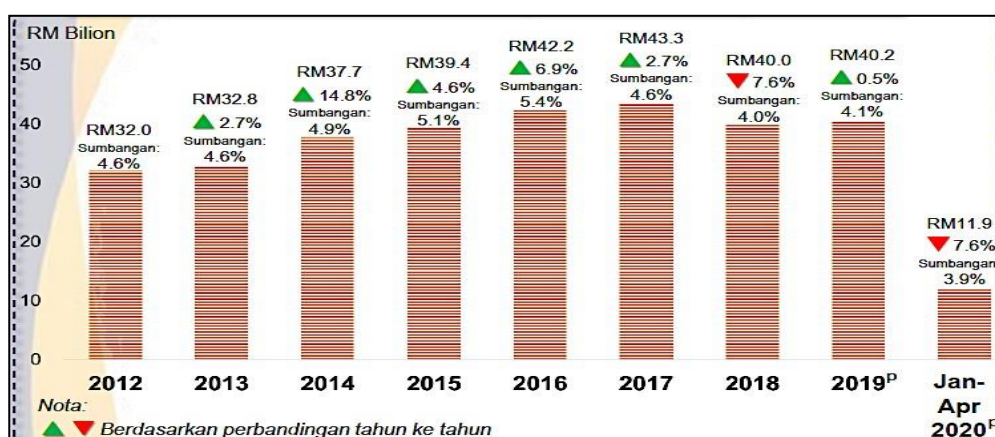
Source: HDC, 2017

As well as own halal certification, *JAKIM* also recognises foreign *halal* certification bodies and authorities across 33 countries. This includes four bodies on the Chinese mainland (Beijing, Henan, Shandong and Ningxia). The Recognised List of Foreign Halal Certification Bodies is revised by *JAKIM* on an annual basis. Basically, the halal certification procedure is as

illustrated at Figure 3.25 with three main components of application and fee, audit and report and approval and certification stage.

The food processing industry in Malaysia represents 12 percent of the manufacturing output and growing at approximately 20 percent annually. According to the Malaysian Investment Development Authority (MIDA), approximately 67 percent of potentially halal products are categorised as Fast Moving Consumer Goods (FMCG), and these include processed food and beverages, bakery products, cosmetics and personal care products, confectionery, and nutraceuticals (MIDA, 2020). FMCG are products that are quickly sold in the market and include items such as packaged food, beverages, toiletries and other consumables. This is a new sub-sector that will be developed in the North Corridor Economic Region (NCER) under the 12MP to cater to the region's growing population demand as provided in NCER Strategic Development Plan 2021-2025 (NCER, 2021).

Figure 3.26: Export of Malaysia Halal Product 2012-April 2020

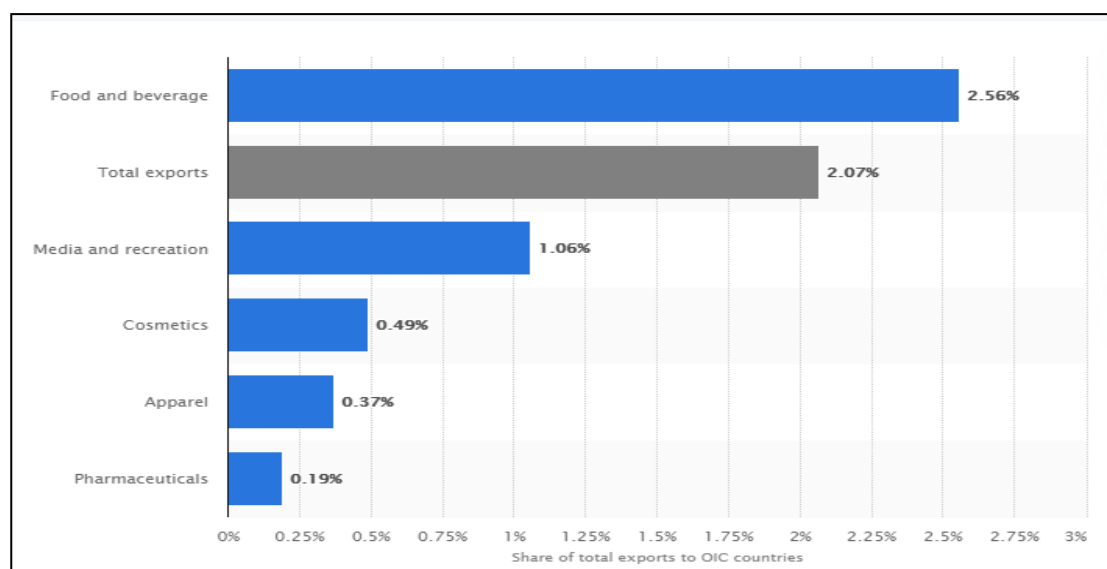


Source DOSM (2021)

As well as local food processing companies, a number of multi-national companies (MNCs) have now set up their own food processing facilities in Malaysia, with the intention of distributing their *halal* products within the local and ASEAN markets. A case in point is Nestlé, a Swiss company which is one of the world's largest food and beverages manufacturers. Nestlé Malaysia has complied with *halal* best practise since it was first established during the early 1970s, with all of its halal products currently certified by JAKIM. At present, Nestlé

Malaysia has eight halal food factories and produces several proprietary brands, including Maggi, Nescafe and Milo. Nestlé Malaysia is now exports to more than 50 countries, servicing several markets in the Middle East and Oceania. At present, all products manufactured, imported or distributed by Nestlé Malaysia are certified as halal. Other MNCs include Singapore's Yeo Hiap Seng (Yeo's), Netherland-based Dutch Lady, Japan's Kewpie and US-headquartered Coca-Cola. Malaysia has thus become a significant halal food manufacturing base for many overseas companies. The contribution of halal product for exports in Malaysia from 2012 until April 2020 is as shown at Figure 3.26 with the range between 4.6% to 5.4% annually. Malaysian exports to the Organization of Islamic Cooperation (OIC) countries in the halal industries as a share of the total exports to the OIC in 2017, by sector is as Figure 3.27 below.

Figure 3.27: Malaysian Exports to OIC by Sector



Statista, 2021

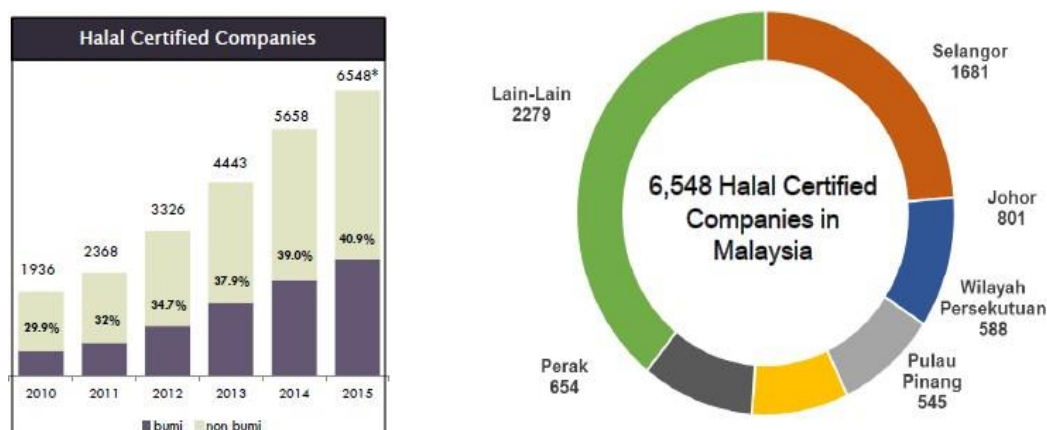
This statistic shows Malaysia's exports to OIC countries in the various sectors of the halal market as a share of the total exports to the OIC countries in 2017. In that year, Malaysia's total exports to the OIC countries amounted to 2.07 percent of the total exports to the OIC countries. Malaysia's exports of food to the OIC countries amounted to 2.56 percent of all food exports to the OIC countries, which is more than one percentage point smaller than Indonesia's share of food exports to the OIC countries.

According to JAKIM, among all the major halal certified products in 2015, 77% were food products and 23% were non-food products. The following is the halal incentives in Malaysia-

- 100% income tax exemption on capital expenditure for a period of 10 years, or income tax exemption on export sales for a period of 5 years
- Full income tax exemption for a period of 10 years, or 100% income tax exemption on capital expenditure for a period of 5 years
- Full income tax exemption for a period of 5 years, or 100% income tax exemption on capital expenditure for a period of 5 years

The Ninth Schedule of the Federal Constitution provides that all matters pertaining to Islam is under the state's jurisdiction. However, for purpose of uniformity and coordination, *JAKIM* is the federal agency responsible for Halal related issues including Halal certification in Malaysia. Perak Halal Corporation Sdn. Bhd. (PHCSB) coordinates the overall development of Halal industry in Perak with its main focus to develop and promote participation of businesses in Perak to the global Halal market (PHCSB, 2021). In December 2020, PHCSB initiated the Halal Incubation Project for Entrepreneurs (HIPER) 2.0 "with the aim to assist entrepreneurs excel in Halal industry through a structured hand-holding program". Accordingly, Perak halal industry has the potential with its abundance of raw materials and land area. In 2015 the number of companies certified as halal in Perak was 654, third in ranking after Selangor and Johor as illustrated in Figure 3.28 below.

Currently, there is a Halal Park in Tambun under MARA and also halal hub operating in Seri Iskandar as well as future planning for halal pharmaceutical hub and Alor Pongsu halal park in the pipeline. It was projected that Perak will have more halal hubs in the future.

Figure 3.28: Halal certified companies by State (2015)

Source HDC, 2020

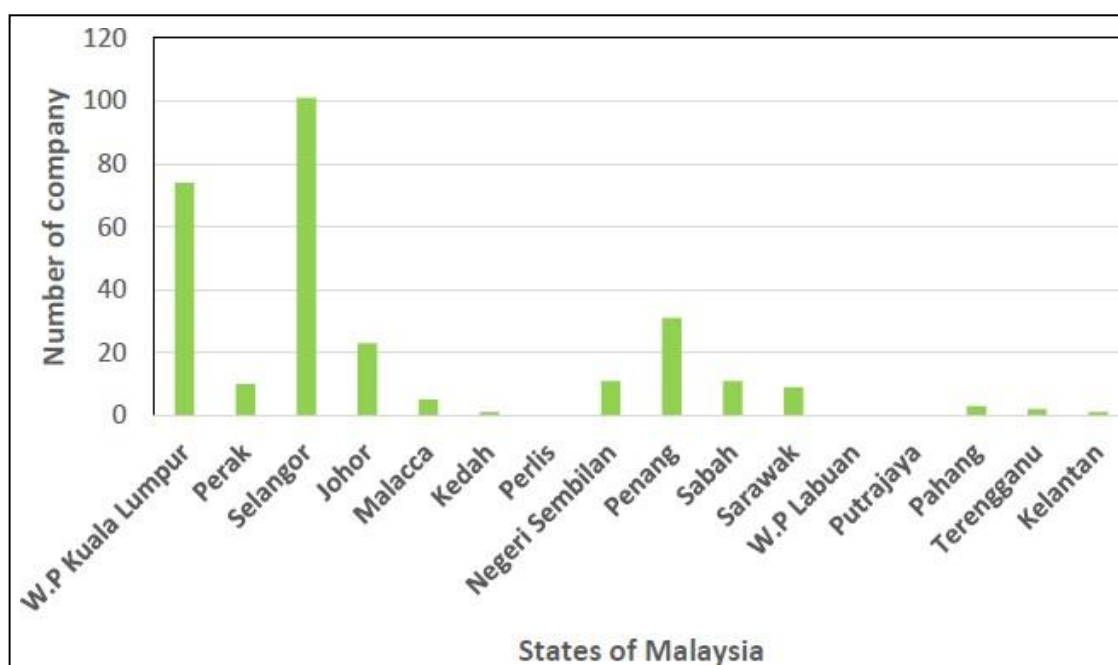
3.9.2.2 Biotech Industry

On the other hand, the Biotech industry in Malaysia is dominated by small to medium sized companies. Currently, there are about 282 companies registered with the Malaysian Biotechnology Directorate under the Ministry of Science, Technology and Innovation with 162 companies are involved in the agricultural sector, 77 operated in Bio-medical and 43 companies in Bio-industrial (Figure 3.29 and 3.30). Out of these 282 companies, only 10 companies are located in Perak (Teo and Tat, 2019). Organisation for Economic Co-operation and Development (OECD) defined biotechnology as the application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.

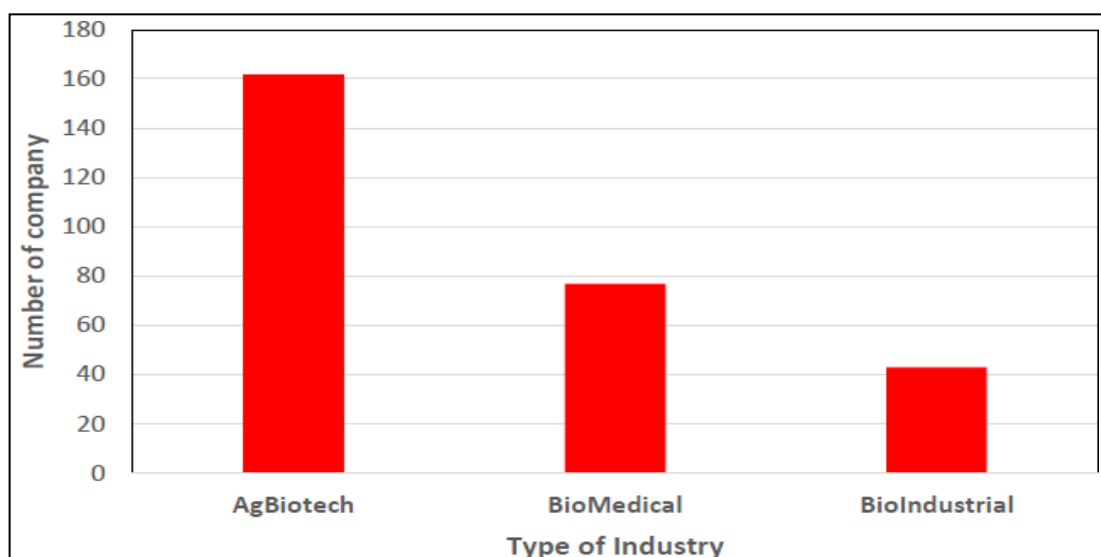
The National Biotechnology Policy (NBP) was created in 2005 to further develop three economic sectors namely agriculture, healthcare and industrial manufacturing, as well as to support the growth of an enabling eco-system throughout the scientific, academic and business communities in the country. It was executed by three phases: Phase I for Capacity Building (2005-2010), Phase II on Science to Business (2011-2015) and Phase III to develop Global Business (2016-2020). The Malaysian Biotechnology Corporation was created as the lead agency responsible for the coordinated implementation of the NBP (Bioeconomy Corporation, 2021).

Biotechnology techniques and practices can advance the manufacturing of halal food products. There are vast opportunities and potentials on biotechnology in Malaysia particularly in the agricultural-biotechnology production of halal products. Another evolving area is food biotechnology using ingredients produced in traditional biotechnology method like fermentation of market products such as soy sauce, yogurt, nata, tempeh, tapai and budu. Food biotechnology can also produce high quality clarified fruit juices. A number of industries producing sweeteners and food additives based on fermentation have been in existence for decades in Malaysia (RA Dardak, 2019).

Figure 3.29: The distribution of Malaysia Biotechnology Company by State



Source: Chee & Huam, 2019

Figure 3.30: The distribution of Malaysia Biotechnology Company by Type of Industry

Source: Chee & Huam, 2019

3.9.3 Potential for Digital Halal Hub and Bio-Technology R&D Centre

Eco-friendly hubs for halal products must be developed with a focus on the green design of infrastructure, cleaner production, pollution prevention, availability and accessibility of raw materials and ingredients, and energy efficiency. It is suggested that Perak utilize the existing built properties as halal hubs. Apart from this, the implementation of digitalized halal hubs will coordinate data information system of investors, manufacturers and consumers.

Suggestion for locations of Halal hubs and Bio-Technology R&D Centre are as follows and presented in Figure 3.31:

- Digital Halal hubs establishment @ Seri Iskandar, Taman Farmasi, Bandar Seri Iskandar
- Bio-Technology R&D Centre @ Silver Valley Technology Park (SVTP), Kinta

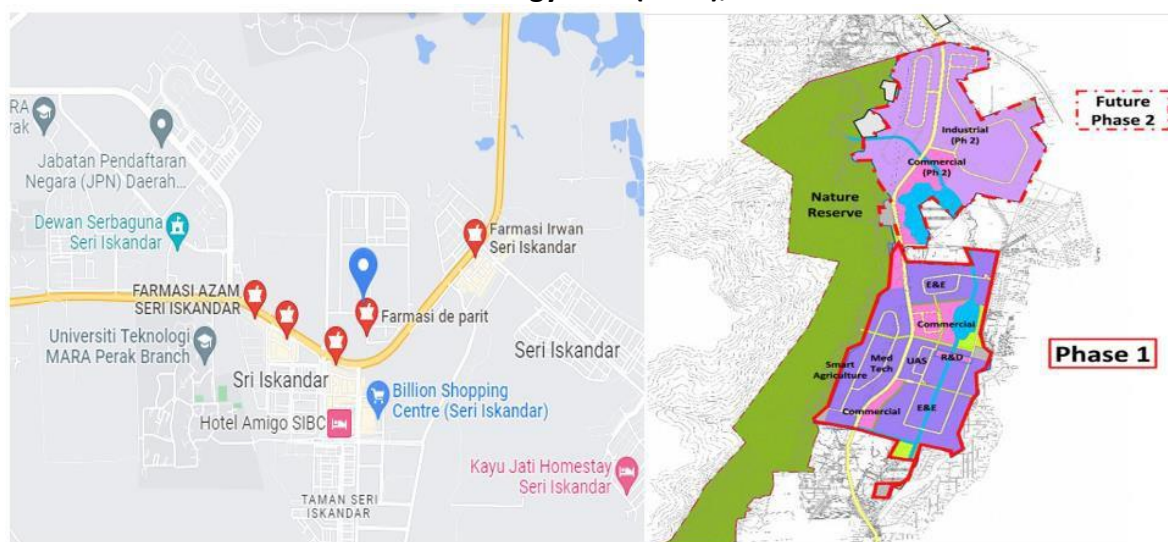
It is predicted that after the pandemic, technological diffusion is likely to accelerate, not because of domestic market conditions, but because of the need to compete in global markets with advanced-country producers that embrace automation, increase agricultural

investment in irrigation, boost productivity and expand export markets. More broadly, during the post-Covid-19 recovery phase, policymakers and producers in all countries with large-scale agriculture will have to pay close attention to trends in automation.

Thus, focus must be given to an integrated development of the halal industry. This involves the systemic development of the entire value chain. Perak has the potential to lead in the development of the Halal food industry. The Halal hubs should have proper management with facilities in relation to certification, standards, training, manpower, laboratory facilities, R&D, waste management and access to raw materials & ingredients for production. It must have sufficient size and production capacity to justify the facilities and amenities available in the area. Incentives should be provided for companies to assist them in the Halal Industry.

Digitalized Halal hub will facilitate as a "virtual one-stop-centre" to assist in the area of determining standards, halal certification, training in the halal industry and auditing, dealing with various local authorities and agencies related to the halal industry, man power, amenities and waste management facilities all in one place. It will also serve as a meet-up place for investors, manufacturers as well as consumers.

Figure 3.31: Seri Iskandar Digital Halal Hub & Bio-Technology R&D Centre @ Silver Valley Technology Park (SVTP), Kinta



Pharmaceutical Hub @Seri Iskandar Silver Valley Technology Park (SVTP)

3.9.4 Implementation Strategy

The implementation strategy to strengthen the ecosystem of Halal and Bio-technology in Perak are suggested as follows:

3.9.4.1 Utilising the existing Halal Hub and Bio-Technology R&D Centre

Utilising the existing Halal Hubs @ Seri Iskandar and Bio-Technology R&D Centre @ Silver Valley Technology Park (SVTP), Kinta, Perak (Figure 3.32) are based on the following justifications:

- High demand and potential to promote industries based on halal products (food and non - food) to meet the local and international needs.
- Utilizing existing industrial areas that are not fully developed such as that in Taman Farmasi Seri Iskandar.
- Strengthening the existing industrial activities.

Figure 3.32: Map of locations for Potential Digital Halal Hub

Source: UKMPakarunding, 2022

3.9.4.2 Improve inter-regional trade

In terms of Halal and food security issue, the impact of the COVID-19 pandemic on the agricultural sector has brought unprecedented challenges. The pandemic threatens to not only stagnate progress towards the Sustainable Development Goals including Goal 1 (No Poverty) and Goal 2 (Zero Hunger), but indeed has the potential to reverse the gains made in recent years, thus jeopardizing the global community's shared promise to 'leave no one behind'.

Sustainable agricultural mechanization or smart agriculture can play a key role in enabling recovery and building long-term resilience of the farming community. It can improve input use efficiency, productivity and incomes in agriculture, benefiting both food security and livelihoods, while empowering farmers to better cope with future hindsight.

In order to make Malaysia a global Halal hub, we need to have the capability to manufacture a variety of products and halal goods. This can be done by increasing the number of producers of halal products among SME which are widely available in the states. There is also the need to enhance coordination among agencies to promote the development of global halal industry and strengthening the human capital development.

In 2018, the number of jobs created reached 330,000 on halal markets in Malaysia. (HDC, 2020). This was an indication of the potential of Halal market for jobs creation. Apparently, labour scarcity and high costing are major constraint everywhere during the COVID-19 pandemic and will likely to stay even after the pandemic if proper actions are not taken to overcome the issue.

Total jobs in the Malaysian private sector in Q4 2020 fell by 204 thousand from Q4 2019 (8,661 thousand jobs) to record 8,457 thousand jobs. The rate of filled jobs in this quarter was 97.9 per cent, slightly higher than the same quarter of the previous year which was 97.7 per cent. Looking at the breakdown of jobs by skill category, jobs in the skilled category in Q4 2020 dropped by 36 thousand to 2,065 thousand on jobs (Q4 2019: 2,101 thousand jobs). Out of this total, 98.0 per cent was filled jobs (2,025 thousand) while the remaining 2.0 per cent were vacancies (41 thousand). There were 5 thousand jobs created in this category during this quarter. Jobs was predominantly in the semi-skilled category with a share of 62.4 per cent or 5,279 thousand jobs. The number of jobs declined by 129 thousand from 5,408 thousand in Q4 2019. Jobs in this category comprising of 98.1 per cent of filled jobs (5,181 thousand) and 1.9 per cent of vacancies (98 thousand). More than half of jobs created were in this category which accounted 63.2 per cent from the total jobs created (11 thousand). Meanwhile, jobs in low-skilled category decreased by 40 thousand posted 1,113 thousand jobs in this quarter compared to 1,153 thousand in Q4 2019. Low-skilled jobs constituted of 96.7 per cent of filled jobs (1,076 thousand) and 3.3 per cent of vacancies (37 thousand). During this quarter, a total of one thousand jobs were created (DOSM, 2021).

SMEs play a critical role in all economies by fuelling growth, increasing the demand for labour and generally raising living standards. Supporting women-owned SMEs in particular can be a

powerful tool to promote women's economic empowerment. It is estimated that 500 million new jobs will be needed by 2030, and a significant proportion of these will be in countries belonging to the Organisation of Islamic Cooperation (OIC), where 60% of the population are under the age of 30. Supporting SMEs to be vectors of growth will also be a clear response to the United Nations Global Goals for Sustainable Development.

Apart from that, Halal training faced many issues, such as various different types of training programs and lack of structured training programs. The high turnover rate also creates issues and challenges for Halal industry. It means that firms must allocate costs for training a new hire. Firms also need to provide objective, fair and transference performance appraisal to motivate employees, therefore managing performance management is crucial for employee performance. Skilled workforce requires training designed for its specific purpose. For example, the need for Halal Assurance System Personnel who is in-charge for a systematic approach to identify non-halal contamination and control measures to ensure halal and safety status of products and services.

Training for Halal Executives is also conducted by multiple organizations, including public universities, and consultant companies. Universities are actively involved in the halal food control system in numerous ways. Besides halal analysis development and testing, Malaysian public universities offer Master's and PhD programmes in halal food analysis that include new techniques for halal products authentication, as well as innovations on alternative halal products. More courses on managements, social sciences, and laws have been introduced. Perak for example, through Universiti Sultan Azlan Shah should take this opportunity to provide for more designed and specific courses in the halal and bio-technology area. Universiti Teknologi Petronas (UTP) could also play a role to offer courses to cater for smart agriculture via its engineering courses.

Other than formal training at higher learning institutions, in-house training to develop expertise and understanding of the complexities inherent in the halal market are similarly important elements for success. With the growing complexity of supply chains, ensuring end-

to-end halal integrity is not simple such as safety measures, halal is the responsibility of the manufacturer, and should be built in, not added on.

3.9.4.3 Attract the Participation of Local and Foreign Investors in the new Halal and Bio-Technology Park

Collaboration with international company would be an added advantage. One show case of successful venture is the NCER collaboration with Enza Zaden.

Figure 3.33: Enza Zaden @ Sauk, Perak



Source: Google search

On 30 March 2018, Enza Zaden, chose Kampung Biong, Sauk, Kuala Kangsar, Perak (Figure 3.33) for its first research and development (R&D) and highland breeding centre in Southeast Asia to create high-quality genetics in vegetable varieties and vegetable seeds, with 20 hectares (49.4 acres) of terraced irrigated trial fields, several greenhouses and tunnels for breeding activities, phytopathology research and farm support buildings. Enza Zaden is a Dutch vegetable-breeding company and a leading independent family business supplying quality vegetable seeds for 80 years. This effort is with the cooperation from the Northern Corridor Implementation Authority (NCIA) to develop new vegetable varieties that can attune to the region's market and climate demands. Among the vegetable seeds that are being tested at the centre are hot pepper, onion, tomato, eggplant, corn, yard-long beans, watermelon, and pumpkin.

Enza Zaden aims to change the conventional methods of performing agricultural activities to modern practices, which translates the national objective of introducing technology and innovation in the agricultural sector. Local farmers need a well-adapted and resilient seeds that produce higher yields as good quality seed is prerequisite to good agricultural production. Enza Zaden's R&D Centre will be purely dedicated for breeding of new hybrid seeds for varieties of vegetables and it is timely as the organisation will be offering new varieties of breeding technologies that are tested and applicable within the local environment. The outcome of the company's breeding efforts will directly benefit the local farmers in the state and throughout the country. Most importantly, the world-class R&D Centre will play a much bigger role as it will bring new job opportunities for the locals to serve major breeding farms in the region as regional headquarters, for new R&D location and as the logistic hub for Southeast Asia.

The presence of the Enza Zaden Asia's headquarters and logistics facilities will strengthen the industry's requirement to support new agriculture activities in Perak and Malaysia as a whole. By storing the seeds at strict temperature and humidity settings, the seeds will maintain these quality standards until they reach the grower. The varieties developed in the R&D station will have to meet a distinctive character and to create added value for the grower and end consumer. This added value can come in terms of disease resistance, total plant yield and improved eating quality of the final vegetable produce. The government's aspiration to increase the income of the farmers could be achieved through the adoption of good agricultural practices which include high quality seeds. This collaboration opens up opportunities and becomes a catalyst in transforming Malaysia into a major contributor to the global tropical seed industry.

In contrast to the traditional view that halal was primarily related to slaughter methods, it is now widely accepted that halal integrity must be maintained throughout the entire supply chain. The perspective of the halal market and the importance of maintaining the integrity of the entire value chain creates enormous opportunities for SMEs to be part of the sector. Be it in the areas of farming, processing and manufacturing or in providing support services, new areas of activity are opening fresh prospects.

3.9.5 Estimated Cost

The following is an estimate of the overall cost that needs to be prepared to ensure the feasibility of this action plan.

Activity/Strategy	Estimated cost*	Lead Agencies
Initiative 1: Halal Hubs@ Seri Iskandar and Bio-Technology Lab @ SVTP, Kinta	RM1.1 M	Perak Corp & NCER
Initiative 2: Enhance food security and create new marketable products to promote diversification	RM1.7	Perak State Agricultural Development Corporation (SADC), Department of Agriculture Perak & MARDI
Initiative 3: Improvise inter-regional trade, which will result in shorter food chains, create more markets for farmers and improve access to both inputs (seeds, fertilisers) and outputs (food products).	RM1.7M	INVEST Perak & Perak Corp
Initiative 4: Strengthening the human capital development	RM1.2 M See Intervention Programme (7) and (8).	USAS/UTP Polytechnics/ MARA
Initiative 5: Attract the Participation of Local and Foreign Investors in the Halal Hubs & Bio-technology Lab (For promotional purposes, overseas working visits, industry engagement sessions, and update data)	RM500 K	INVEST Perak & Perak Corp
Initiative 6: Establishment of research and development collaborations including innovation and commercialisation initiatives through Public Private Partnership (PPP)	RM 15.1M	NCIA & INVEST Perak
Initiative 7: Establishment of digitalized Halal & Bio-Tech hub to create a digital platform and intensify the opportunity of halal and bio-technology global market demand through entrepreneurship programs and activities especially for the SMEs to assess and access market potentials and global demand	RM500K	INVEST Perak & SME Corp
Total Estimated	RM21.8 M	

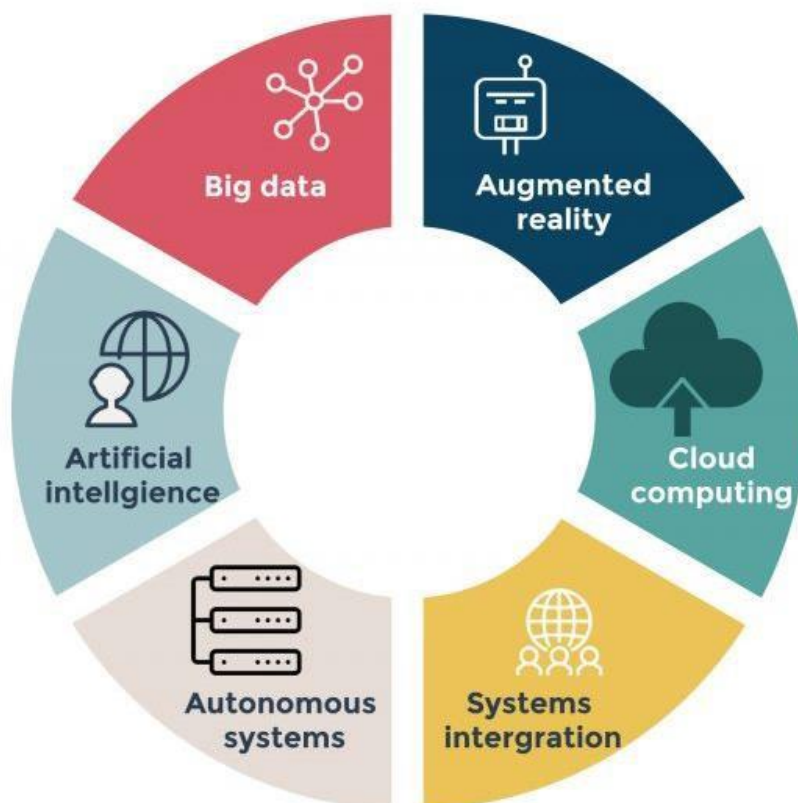
* *Cost estimates only. The responsible party must detail the actual cost of each activity.

3.10 Digital Global Business Services Hubs

3.10.1 Background

The 4th Industrial Revolution (IR4.0) brings opportunities for large and small companies, but many of them find it difficult to decide in which technologies to invest and how to secure financing for their digital transformation. In today's manufacturing domain, companies need to be able to adopt digital technologies, joining the Industry 4.0 paradigm. The Industry 4.0 (I4.0) include the use of emerging technologies such as big data and analytics, autonomous robots and vehicles, additive manufacturing, simulation, augmented and virtual reality, horizontal/vertical system integration, Internet of Things (IoT), cloud computing and edge technologies, and blockchain and cyber-security (Figure 3.34).

Figure 3.34: Examples of Emerging Technologies



Often companies faced hurdles in identifying a suitable digital technology readiness. It could be not enough to deploy just a new digital technologies in their manufacturing plant. They need to be able to adequately employ these kind of technologies in value-added processes for exploiting their full potentialities, and thus reaching a suitable digital maturity. Since 2016, Digital Innovation Hubs (DIHs) have been considered as one of the key elements of the Digitizing European Industry (DEI) strategy. Providing a proper definition, a DIH is a single organisation or a coordinated group of organisations with complementary expertise, with a not-for-profit objective that support companies especially SMEs and/or the public sector in their digital transformation. Needing help to become more competitive by improving their business/production processes by means of digital technology, DIHs have been identified as a strategic means to support companies' digital transformation, especially SMEs, and foster digital technologies' adoption in their business.

Some of the services that DIHs could provide include:

- act as one-stop-shops, serving digitalisation of companies within and outside their region. The main role is assisting customers address challenges in a business-focused way and with a common service model, offering services that would not be readily accessible elsewhere. The services available through a DIH allow any business to access the latest knowledge, expertise, and technology for testing and experimenting with digital innovations relevant to its products, processes, and/or business models.
- provide connections to investors, facilitate access to the financing for digital transformations, and help to connect users and suppliers of digital innovations across the value chain.
- foster synergies between digital and other key enabling technologies (such as biotech, nanotechnologies, and advanced materials). These services are of particular relevance to companies currently at a relatively low level of digitisation that do not have the resources and/or personnel to address the digitisation challenge.

3.10.2 Potential for Digital Global Business Services Hubs @ Meru

3.10.2.1 DGBS for economic growth

Currently, the agenda of DIHs in Perak is under the responsibilities of Digital Perak Corporation Holdings (DPCH), which is the ICT arm of the Perak State Government. The existing Digital Innovation Hubs at Meru could be extended to include Digital Global Business Services Hubs (DGBSHs). The service portfolios of DIHs need to be clearly defined and adequately grouped to include the DGBSHs extensively.

The Digital Global Business Services (DGBS) industry is one of the key contributors to Malaysia's digital economy. While active GBS companies accounts for approximately 20 per cent of total active MSC Malaysia companies, they are the largest contributor to the overall performance of MSC Malaysia, adding up to 50 per cent of investments, 66 per cent of exports, and 61 per cent of jobs created. In 2021, there are currently 579 GBS companies within MSC Malaysia, with 57 per cent being foreign direct investments (FDIs). Furthermore, 30 per cent of these foreign-owned GBS are part of the Forbes Global 2000 and Fortune500 companies, including HSBC Electronic Data Processing, Dassault Systèmes and Jabil Global Business Services.

MDEC's initiatives on 'Digital Investments Future5 (DIF5) Strategy', a five-year plan focus on five key thrusts aimed at attracting investments and advancing Malaysia's digital economy and the Malaysia Digital Economy Blueprint (MyDIGITAL). Besides targeting the creation of 50,000 high-value jobs, DIF5 places focus on 5 industry sectors and plans to attract 50 Fortune500 tech companies to land and expand in Malaysia, with the DGBS industry being one of the focus industries. According to AT Kearney's Global Services Location Index, Malaysia ranks third behind India and China as the world's most competitive GBS locations. The DGBS industry has grown along with Malaysia's digital transformation. In the mid-2000s, MDEC began placing emphasis into the shared services and outsourcing (SSO) industry, a precursor to GBS. In 2006, Outsourcing Malaysia (OM) was formed to promote Malaysia as a DGBS hub. Thus, Perak should clearly position itself to take advantage of the DGBS industry and DIF5 strategy.

3.10.2.2 Location @ Meru Raya

The advantage of Meru Raya as DGBSHs location are as follows:

- Modern City - Meru Raya, is another area in Ipoh City that is increasingly showing the splendor and identity of a modern city (Figure 3.35). The city is the Main Settlement Center in Ipoh which is designed to be a Commercial and Tourism Administration Center based on ICT and High technology.

Figure 3.35: Overview of Meru Raya



- Easy Access - The planned development that is being implemented on more than 1,890 acres of land, near the PLUS/Ipoh-Lumut Highway junction and Jalan Jelapang Chemor has grown rapidly (Figure 3.36).

Figure 3.36: Access Road to Meru Raya



- Ready commercial facilities and Infrastructure - Meru Raya covers a commercial area with infrastructure facilities appropriate to its status as a cyber city as well as the construction of new government offices, shop houses, housing estates and a vibrant supermarket.

- Affordable cost of livings - more than 1,000 affordable housing units until luxury condominiums have been and will continue to be built will certainly succeed in attracting the attention of residents from Jelapang, Chemor, Klebang and others to start looking for suitable and comfortable locations in Meru Raya. Among the housing development that you can see such as 1Meru, Mesu Desa Park, Casa Kayangan (affordable housing development), Taman Halaman Meru Suria@Meru and 1Malaysia People's Housing (PR1MA) as well as basic facilities such as Amanjaya Terminal, day schools and International schools.
- Multi-cultural and multi-lingual population - Perak is a multicultural state, with Malaysians, Chinese, and Indians comprising the bulk of the population. These three groups interact during school to the workplace, and tend to coexist quite peacefully, despite the difference in cultures and religions. Although Bahasa Melayu is the national language, English is the main medium of communication between the various ethnic groups in Malaysia. Mandarin is also being communicated among the community in Perak. For global business services, English and foreign language skills such as Mandarin, Korean and Japanese are essential to run services. As the population in the Perak is multi-cultural and multi-lingual, it is not difficult to create a skills hub to support the service industry.
- Ready talent - Perak has knowledgeable and highly skilled manpower from its manufacturing industry that are ready to be hired for DGBS. Universites and other Institue of Higher Learning such as University Technology Petronas (UTP), University Technology Mara (UiTM) and University Tun Abdul Rahman (UTAR) as well as other colleges could provide pool of talent for DGBS. Other technical colleges in Perak such as Skills College, Community College, Giatmara and others also contribute to the skilled workforce.

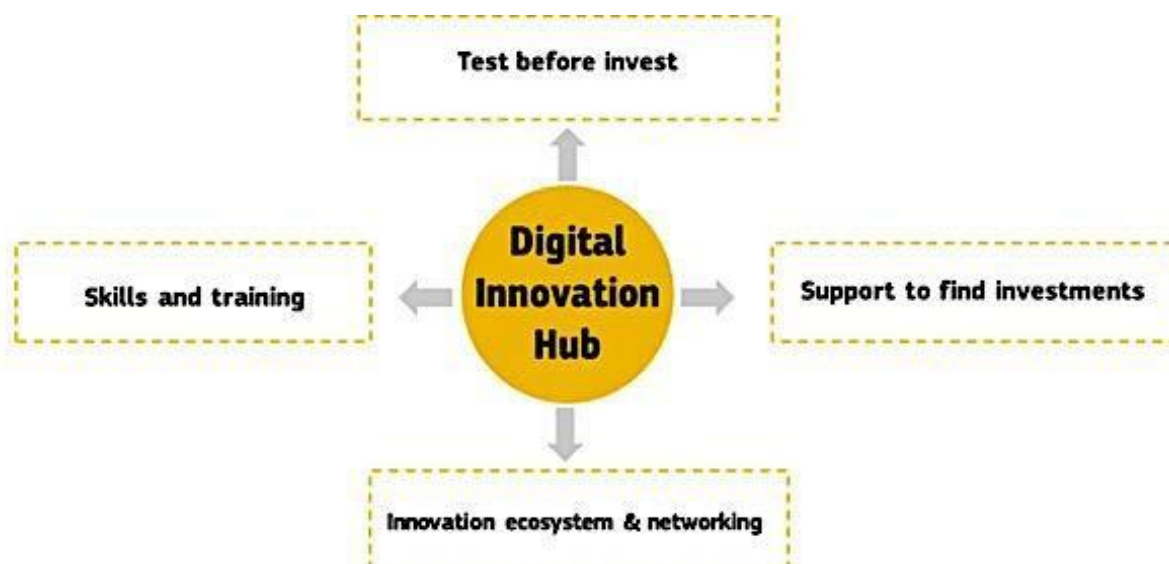
3.10.3 Implementation Strategy

The main dimensions that are needed to be considered by DGBSHs to support SMEs digital transition, i.e., ecosystem, technology, business, skills and data. Indeed, the main aim of the research has been to raise the awareness about each of these dimensions in the digital domain, raising the need of adding the skills and data dimensions of services to the traditional

ecosystem, technology, and business. The portfolio of DGBSHs activities (Figure 3.37) should also cover:

- Technology Sandbox - Test before invest through experimental use of new software and hardware digital technologies in order to understand new opportunities and return on investments. The sandbox should include demonstration facilities and piloting.
- Skills and training to make the most of digital innovations: train-the trainer programmes, boot-camps, traineeships, exchange of curricula and training material are important
- Support to investment funding: feasibility studies, developing business plans, incubation and acceleration programmes.
- An innovation ecosystem and networking opportunities through marketplaces and brokerage activities.

Figure 3.37: Digital Innovation Hubs



By introducing and implementing a common vision and framework of DGBS industry for fostering digital transformation of Perak's entrepreneurs, DGBSHs have significant impact on digital transformation in manufacturing industry as they facilitate contacts between regional authorities, suppliers, and users along the “value chain”. This could boost Perak's excellence in supporting the digital transformation of manufacturing industry. By acting locally, close to the needs and digital challenges of regional companies, DGBSHs provide supports to entrepreneurs in improving their competitiveness on the local and global market to ensure successful winning globally. For example, some SMEs participate in the global value chain and provide services based on their expertise as suppliers, distributors, and business service providers. SMEs in logistics, financial institutions, and market research firms as well as wholesale and retail services who provide services to various industries, if supported by DGBSHs will more competitive in the future.

The following steps should be considered towards establishing the DGBSHs @ Meru.

3.10.3.1 DGBS Ecosystem Development

The development of a world-class DGBS ecosystem is an important initiative to ensure DGBSH@Meru becomes the best DGBS hubs in Malaysia and Asia. The world-class DGBS ecosystem will facilitate the growth of local industries while attracting global investors to Malaysia. These include:

- Provide the types of services that can be offered as Digital Global Business Services.
- Provide a viable development area to be a Digital Global Business Services Hub
- Obtain MSC status for the selected building or location
- Provide internet facilities and high speed broadband network
- Promote the location of the Global Business Services Hubs through MDEC and MITI

3.10.3.2 Increased Global Investment

To increase investment from multinational companies or Fortune 500 high -tech companies to DGBS@Meru, the following steps can be implemented:

- Establishment of a dedicated global investment unit for global business services
- Detail the investment incentives that can be offered to investors
- Participated in MDEC and DIF5 efforts to attract Fortune 500 high -tech companies to DGBSH@Meru
- Promote DGBSH@Meru locally and globally
- Provides highly knowledgeable talent tailored to the needs of Fortune 500 companies

3.10.3.3 Continuous Talent Development

A continuous supply of talent is essential for the DGBS industry to survive and be competitive. The following are important steps that need to be implemented to ensure the continued development of highly knowledgeable talent:

- Strengthen collaboration between industry and universities to provide training needed to enter DGBS industry job market
- Identify areas of collaboration between industry and universities to develop natural laboratory training programs in real workspaces
- Train students through collaborations with identified leading 4IR technology companies such as big data analytics, cloud computing, robotic process automation and blockchain.

3.10.4 Estimated Costs

The following is an estimate of the overall cost that needs to be prepared to ensure the feasibility of this action plan.

Activities	Cost	Lead Agencies
GBS Ecosystem Development	RM10.6 mil	State Secretary Inc, MDEC, NCIA, Digital Perak
Promote DGBSH@Meru as preferred location and to attract Global investment	RM1.32 mil	Digital Perak, NCIA
Continuous Talent Development Programme	RM2 mil	MDEC, Outsourcing Malaysia Association, Digital Perak
Total Estimated Cost	RM12.12 mil	

**All cost expenditures are based on current conditions and will change according to the suitability of implementation*

Prepared by:

