# 3. Sectoral Economic Developments and Prospects

3.1 Manufacturing sector

The manufacturing sector continues to be the core driving economic sector for Penang and Malaysia. In 2019, Penang remained as the second-largest contributor to the sector's GDP in Malaysia at RM41 billion (Figure 3.1). The manufacturing sector accounted for 42.8% of Penang's GDP. The contribution of the manufacturing sector to Penang's economic activity is significantly higher than Selangor (27.8%), Johor (29.9%), and Sarawak (26.9%). This highlights why the manufacturing sector warrants significant policy attention and why the sector arguably has to be the entry point for many policy interventions.

Figure 3.1 Top-four contributing states to Malaysian GDP in manufacturing activity, 2016–19
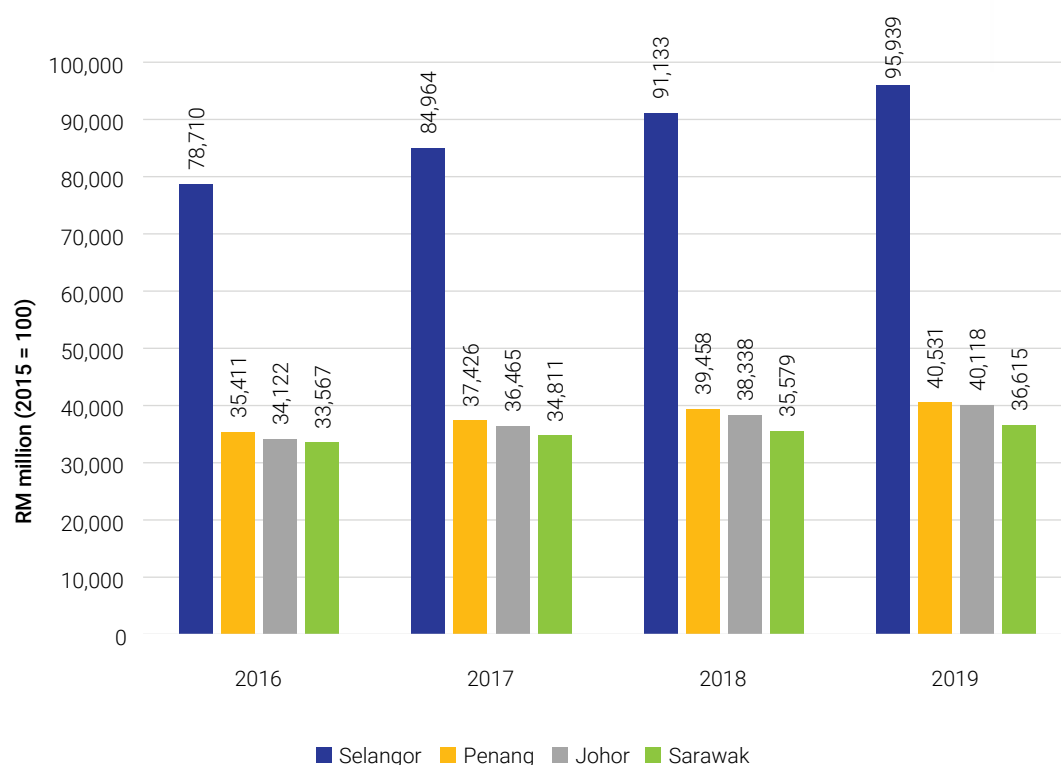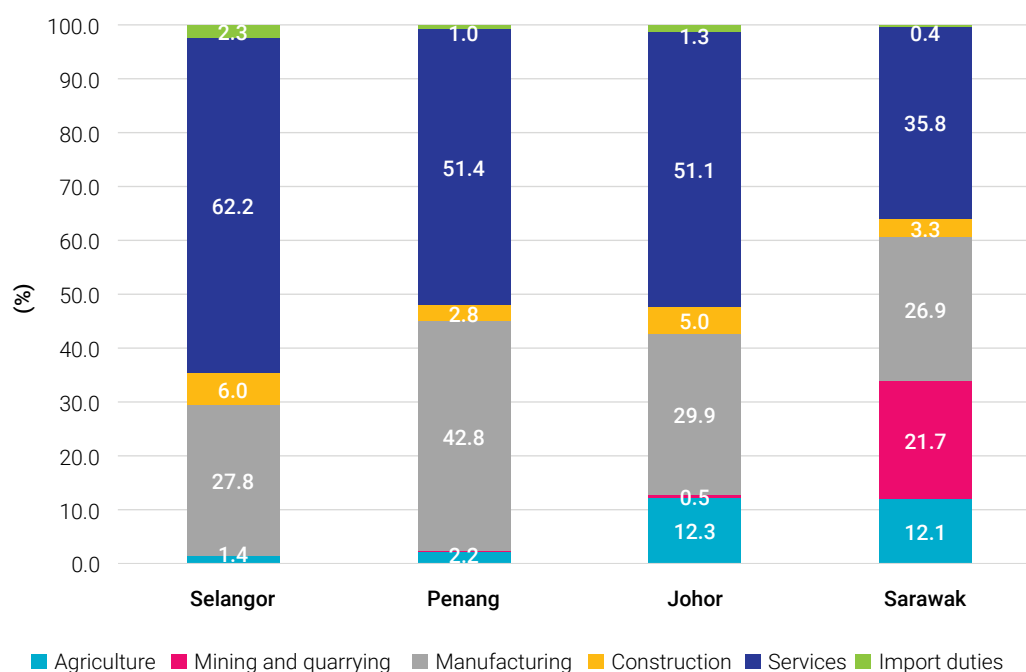

Source: Department of Statistics, Malaysia.

Penang's manufacturing sector also recorded a modest annual growth of 2.7% in 2019, a decline of 2.7 percentage points from the previous year. A similar decline in growth rates has also been observed in other comparable states except Sarawak (Figure 3.2).

Figure 3.2 Annual growth rates of GDP in manufacturing activity for selected states, 2016–19
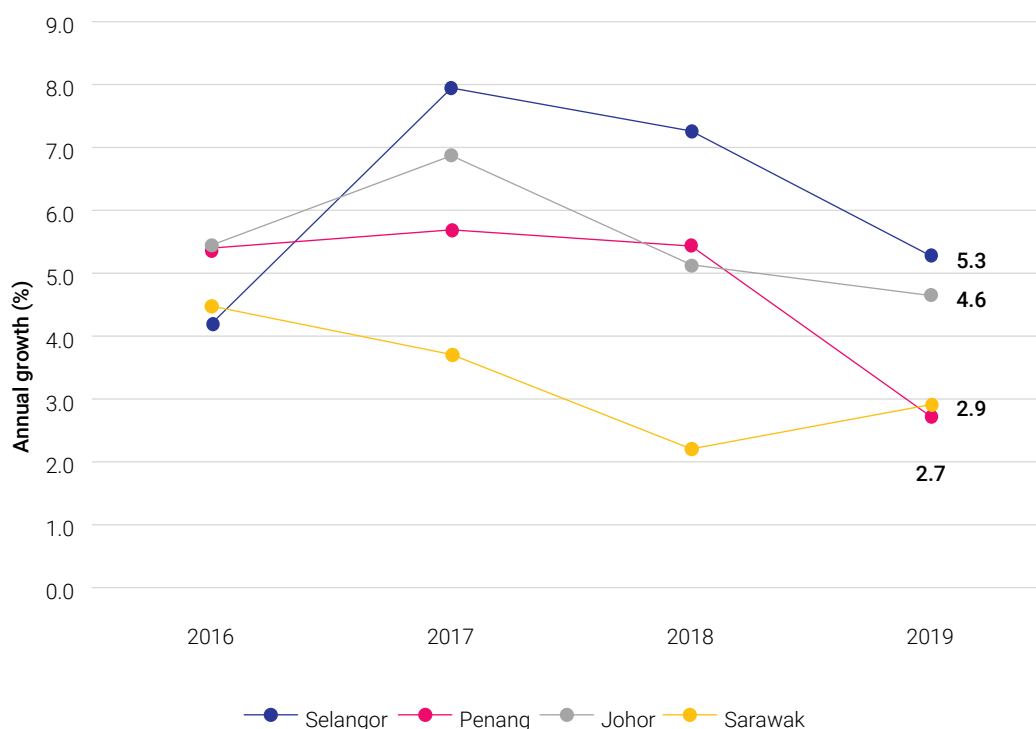
Source: Department of Statistics, Malaysia.

Figure 3.3 Share of economic activity contribution to GDP in selected states, 2019

Source: Department of Statistics, Malaysia.

This sector observed global uncertainty that was brought about by the US-China trade war. In 2018 alone, approximately $360 billion worth of goods and products from the United States and China were levied with tariffs, the impact of which are country- and industry-specific. On an aggregate level, the manufacturing sector in Malaysia showed no significant nor lasting exposure. As seen in Table 3.1, the sales value of own manufactured goods recorded increased growth rates in 2018 (7.7%) and 2019 (4.9%). Likewise, a positive trend is also seen in the number of employees engaged (Table 3.1).

Table 3.1 Sales value and number of employees of the manufacturing sector, Malaysia, 2016–19

Year	Sales value of own (ex-factory)		Number of employees engaged at end of period	
	Total (RM'000)	YoY (%)	Total	YoY (%)
2016	673,222,108	1.3	1,032,897	0.6
2017	765,772,453	13.7	1,057,591	2.4
2018	824,839,857	7.7	1,075,635	1.7
2019	866,018,558	4.9	1,090,614	1.4

Source: Monthly Manufacturing Statistics, Department of Statistics, Malaysia.

The US-China trade war eased temporarily when the COVID-19 pandemic went global, affecting the global manufacturing sector. This effect became prevalent when Malaysia implemented the Movement Control Order (MCO) (Box 3.1). The IHS Markit Malaysia Manufacturing Purchasing Managers' Index in April 2020 was 31.3, down sharply from 48.4 in March. The decrease in new orders, supply-chain delays, and longer delivery times have severely restricted demand for goods (IHS Markit, 2020).

Box 3.1 The impact of COVID-19 on Penang's manufacturing supply chains[22]

By Ong Wooi Leng

The MCO reveals the importance of the local manufacturing supply system. China has been the largest supplier worldwide, with more than 5 million companies with Tier 1 and Tier 2 linkages impacted by the virus. In reality, only 15.2% of businesses in the Chinese manufacturing sector were impacted by lockdowns, and these were largely confined to Guangdong, Zhejiang, and Shandong.

Although the proportion seems small, the ripple effect of the supply-chain disruption has been enough to damage global business operations and supply chains significantly. This affected all industries, including E&E, machinery and equipment (M&E), medical devices, and others. With the MCO in place, many companies are having to consider whether a China-centric supply chain is sustainable, despite the fact that cost of input and technical capabilities are major concerns. Compared with 2004 (during the SARS epidemic), about half of companies today said that they are now more reliant on China as a direct or indirect supplier.

With the new border control measures, firms that have relied on overseas supply chains will have to look for alternative suppliers and parts that are available locally. A study conducted by the Penang Institute found that some multinational corporations (MNCs) have obtained most of their supplies from companies in Malaysia. This shows the importance of local and foreign companies in expanding their supply chain base and have multiple alternative suppliers, as well as the importance of enhancing the supply chain management system.

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[22] Adapted from Ong, W.L. and Lee, S.M. (2020).

This can be done through supply network mapping by collecting information related to suppliers, sites, parts, and products, and then making an assessment. With Penang having a well-developed manufacturing ecosystem, an inventory of local suppliers is urgently needed, especially when supply chains are disrupted on a global scale.

The MCO has had a two-way effect on manufacturing firms in Penang and Malaysia. This can be summarized through supply and demand shocks as presented in Figure 3.4.

Figure 3.4 A summary of supply and demand shocks to manufacturing operations in Penang
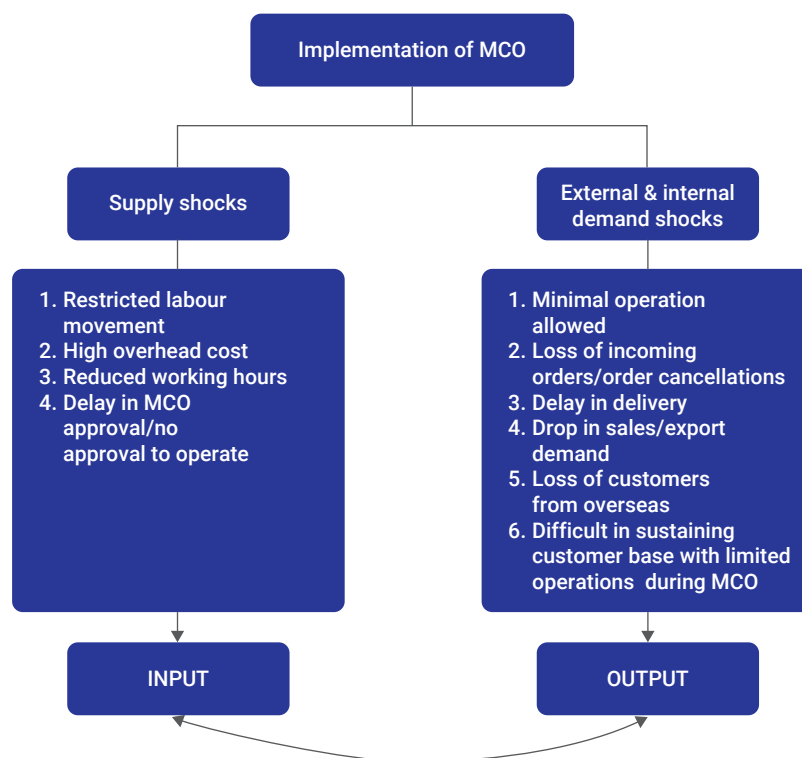
Source: Survey responses (N=22).

During emergencies, the study proposed that policymakers should undertake the following strategies in their policymaking. These include:
   a. Making clear guidelines available for both employers and employees in emergency situations.
   b. Providing staggered financial assistance to SMIs/SMEs.
   c. Enhancing improved collaboration between the state and federal governments to develop a practical containment strategy at the corporate level.
   d. Enabling systematic, effective, and coordinated policies across government departments.

Penang is observing a more significant and lasting impact on its manufacturing sector because of the trade war. A significant portion of Penang's manufacturing activity is in the electrical and electronics products and transport equipment and other segments, which align with the sectors most affected by the US import tariffs (Bown et al., 2018). Such sectors have seen a rise in exports as reported in Chapter 2.2 of this report. Feedback from industries in these sectors have correspondingly reported various strategies by exporters to circumvent such tariffs, largely involving shifting production and outsourcing partners to Penang, given its long history and experience in manufacturing supply chains (Pearl, 2020).

The year 2019 also saw Penang reporting the highest-ever total approved manufacturing investment: 166 manufacturing projects amounting to RM16.9 billion (Figure 3.6). This accounted for about 20.4% of Malaysia's approved manufacturing investment, a close second to Selangor, which accounted for 20.6% (Figure 3.5). Foreign direct investment made up as high as 27.8% of Malaysia's total approved investment or RM15 billion, representing the largest share of foreign direct investment in Malaysia. Top foreign investments were from the United States, Singapore, and the United Kingdom.

Figure 3.5 Percentage share of foreign direct investment by state, Malaysia, 2019

Total foreign investment: RM53.9 bil (2019)
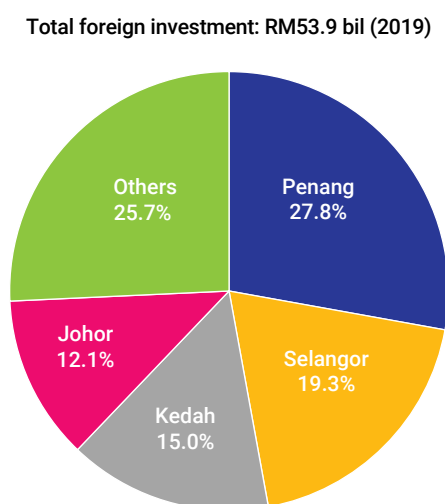
Source: Malaysian Investment Development Authority (MIDA).

Figure 3.6 Total investment in Penang, 1980–2019
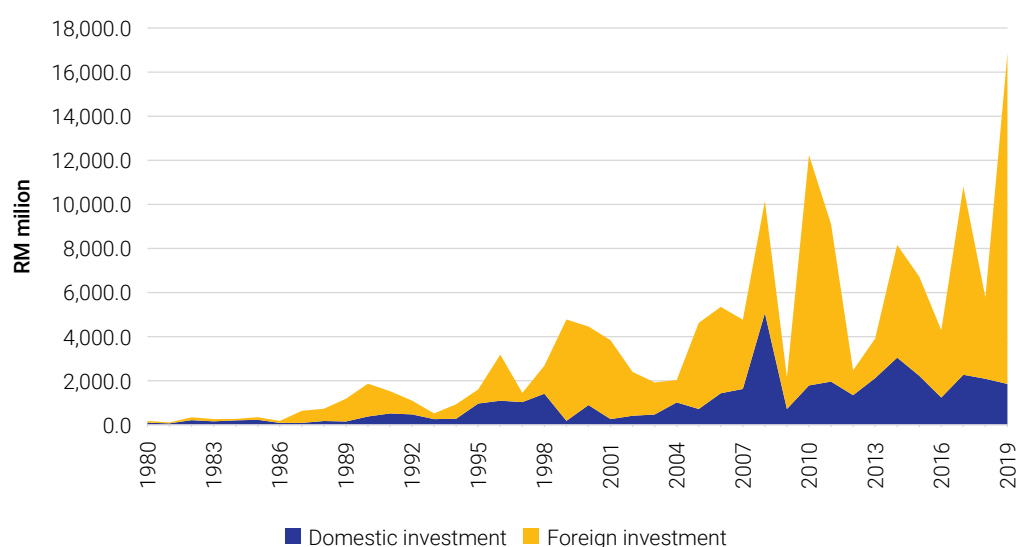
Source: Malaysian Investment Development Authority (MIDA).

Among the foreign investors, the United States was Penang's primary investor, contributing over half of the total amount of approved manufacturing investment for the first three quarters of 2019. Announced investments included Micron Technology, Jabil Circuit, Bruker Malaysia, and National Instruments. Singapore was the second-largest foreign investor in Penang (12.3%), followed by the United Kingdom (10.1%) and Taiwan (5.9%).

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[23] Besides the E&E sector, Penang has also placed an emphasis on the medical devices sector. Box 3.2 presents a summary of Penang's medical devices sector.

A breakdown by industry shows that the electrical and electronics (E&E) and scientific and measuring equipment (which includes medical devices) collectively accounted for 86% of Penang's total investments in 2019 (Table 3.2)[23]. E&E products are responsible for nearly 60% of Penang's total investments in 2019 (Table 3.2). This industry is expected to create 18,886 job opportunities, which is about twice the number of jobs created in 2018. In terms of the medical devices industry, Penang is home to seven medical devices firms that are in the top-25 worldwide (Box 3.2).

InvestPenang reports that this record investment amount is in part a strategy by manufacturers to diversify their geographical footprint amid the global trade war that began in 2018. This is particularly true for those in the aforementioned industries, which are directly affected by the trade war.

Table 3.2 Approved manufacturing investments by industry, Penang, 2019

Industry	Employment		Domestic investment		Foreign investment		Total capital investment	
	No.	% share	RM mil	% share	RM mil	% share	RM mil	% share
Electronics and electrical products	12,432	65.8	351.5	18.9	9,543.7	63.6	9,895.1	58.7
Scientific and measuring equipment	1,687	8.9	65.0	3.5	2,388.2	15.9	2,453.2	14.6
Machinery and equipment	1,306	6.9	242.5	13.1	2,151.8	14.3	2,394.3	14.2
Non-metallic mineral products	173	0.9	19.5	1.1	423.2	2.8	442.8	2.6
Chemical and chemical products	148	0.8	401.5	21.6	30.4	0.2	431.9	2.6
Fabricated metal products	751	4.0	327.2	17.6	34.1	0.2	361.3	2.1
Plastic products	711	3.8	74.3	4.0	174.0	1.2	248.4	1.5
Transport equipment	319	1.7	97.7	5.3	123.9	0.8	221.6	1.3
Food manufacturing	424	2.2	102.7	5.5	2.2	0.0	104.9	0.6
Wood and wood products	194	1.0	15.1	0.8	41.1	0.3	56.2	0.3
Others	1359	7.2	275.6	14.9	131.1	0.9	406.8	2.4
Total	**18,886**	**100**	**1,854.9**	**100**	**15,000.4**	**100**	**16,855.4**	**100**

Source: Malaysian Investment Development Authority (MIDA).

Box 3.2 Industry mapping and value chain analysis of medical devices companies in Penang[24]
By Dr Lee Siu Ming

While the electrical and electronics (E&E) industry remains as a major driver of Penang's investments (54% of total approved investments in 2014–18) and industrial activities, the state has experienced diversification in its industrial activities, with one major industry being the medical devices manufacturing. Penang has established itself as a destination of choice for the manufacture of orthopaedic and cardiovascular products.

Seven of the world's top-25 medical devices manufacturers have operations or have announced their investments in Penang: Abbott Laboratories, Cardinal Health, Boston Scientific, B.Braun, Smith and Nephew, Canon Inc., and Haemonetics.

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[24] Adapted from Lee, S. M. (2020).

Based on data from International Trade Centre (ITC), complemented by data from the Malaysia External Trade Development Corporation (MATRADE) and directories of the Malaysian Industrial Development Authority (MIDA) and Association of Malaysian Medical Industries (AMMI), around 30 companies were identified in the medical devices manufacturing industry in Penang. A large concentration of firms is involved in the product categories of disposables, surgical instruments, and therapeutics. A high concentration of foreign firms was observed in the surgical instruments and therapeutic segments.
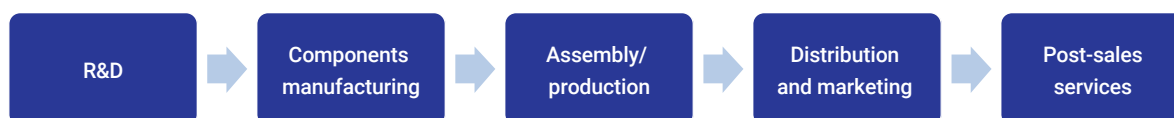
Table 3.3 Medical devices companies in Penang by product segments

Disposables	Surgical instruments	Therapeutic
Latex-based	Alliance Contract Manufacturing Sdn. Bhd.	Alliance Contract Manufacturing Sdn. Bhd.
Alliance Rubber Products Sdn. Bhd.	Ambu Sdn. Bhd.	B Braun Surgical Sdn. Bhd.
Central Elastic Corporation Sdn. Bhd.	B Braun Surgical Sdn. Bhd.	Boston Scientific (Malaysia) Sdn. Bhd.
Concept Rubber Products Sdn. Bhd.	B.Braun Medical Industries Sdn. Bhd.	Knowles Electronics (Malaysia) Sdn. Bhd.
Dongkuk Techco Rubber Industries Sdn. Bhd.	B.Braun Pharmaceutical Industries Sdn. Bhd.	Orthomedic Innovations Sdn. Bhd.
Gaw Rubber Products Sdn. Bhd.	Boston Scientific (Malaysia) Sdn. Bhd.	Straits Orthopaedics (Mfg) Sdn. Bhd.
Kai Sik Towa Rubber Products Sdn. Bhd.	Knowles Electronics (Malaysia) Sdn. Bhd.	Symmetry Medical Malaysia Sdn. Bhd.
Mapa Gloves Sdn. Bhd.	Lake Region Medical Sdn. Bhd.	UWC Healthcare Sdn. Bhd.
Nastah Industries Sdn. Bhd.	Orthomedic Innovations Sdn. Bhd.	Vigilenz Medical Devices Sdn. Bhd.
Profound Rubber Industries Sdn. Bhd.	St. Jude Medical Operations (Malaysia) Sdn. Bhd.	Visco Technology Sdn. Bhd.
	Straits Orthopaedics (Mfg) Sdn. Bhd.	Woodridge Life Sciences Sdn. Bhd.
Non-latex	Symmetry Medical Malaysia Sdn Bhd	
Alliance Contract Manufacturing Sdn. Bhd.	Vigilenz Medical Devices Sdn. Bhd.	
Ambu Sdn. Bhd.	Visco Technology Sdn. Bhd.	
B Braun Surgical Sdn. Bhd.	Woodridge Life Sciences Sdn. Bhd.	
B.Braun Medical Industries Sdn. Bhd.		
B.Braun Pharmaceutical Industries Sdn. Bhd.		
Boston Scientific (Malaysia) Sdn. Bhd.		
CCB Medical Devices Sdn. Bhd.		
Engineered Medical Systems Malaysia Sdn. Bhd.		
Haemonetics Malaysia Sdn. Bhd.		
Knowles Electronics (Malaysia) Sdn. Bhd.		
Lake Region Medical Sdn. Bhd.		
Orthomedic Innovations Sdn. Bhd.		
St. Jude Medical Operations (Malaysia) Sdn. Bhd.		
Straits Orthopaedics (Mfg) Sdn. Bhd.		
Symmetry Medical Malaysia Sdn. Bhd.		
UWC Healthcare Sdn. Bhd.		
Vigilenz Medical Devices Sdn. Bhd.		
Woodridge Life Sciences Sdn. Bhd.		

Diagnostics equipment	Parts	Others
Alliance Contract Manufacturing Sdn. Bhd.	B Braun Surgical Sdn. Bhd.	
Canon Medical Systems		
Polar Electro Malaysia (M) Sdn. Bhd.		

Source: Penang Institute compilation based on ITC data according to classification in Bamber and Gereffi (2013) and Torsekar (2018).

There is also a more observable concentration of local firms for disposables largely due to the presence of firms in the latex-based industries (accounting for about 33% of the firms in disposable category).

The beneficiaries of the economic spill-overs of medical devices firms' investments in Penang include suppliers in terms of metal, plastic, and chemicals; contract packaging; contract sterilization; medical trading companies; and other related E&E companies involved in the industry.

Figure 3.7 Global value chain for medical devices manufacturing

| R&D | ➤ | Components manufacturing | ➤ | Assembly/ production | ➤ | Distribution and marketing | ➤ | Post-sales services |

Source: Bamber and Gereffi (2013).

The highest concentration of medical devices companies in Penang are involved in components manufacturing, assembly, and production. Companies such as B.Braun and Ambu have established centres of excellence (CoEs) while Vigilenz and CCB Medical Devices have established R&D capacity (described as a high-value segment). With more global OEMs focusing on investments in innovation and advanced technologies, specialized contract manufacturers in Penang can gain traction through engineering capabilities and the ability to scale capacity. Localisation by multinationals to local suppliers appears to be relatively more challenging than other industries due to stringent medical devices standards and local companies' capability to scale.

Table 3.4 Principal statistics of manufacturing sector by state, 2017

| State	Value added (RM mil)	Total number of persons engaged	Salaries and wages paid (RM mil)	Average salaries and wages paid (RM'000)	Value added per worker (RM`000)
Selangor	82,174.9	661,676	24,049.9	36.3	124.2
Penang	40,611.9	288,127	12,164.6	42.2	141.0
Johor	39,926.4	473,278	13,770.6	29.1	84.4
Sarawak	37,428.4	101,324	3,062.5	30.2	369.4
Terengganu	14,709.3	26,620	1,176.4	44.2	552.6
Malacca	14,130.8	89,040	3,250.2	36.5	158.7
Kedah	13,687.2	105,181	3,258.0	31.0	130.1
Negeri Sembilan	13,611.3	81,028	3,081.9	38.0	168.0
Perak	11,645.3	143,161	3,930.2	27.5	81.3
Pahang	9,148.3	46,682	1,607.1	34.4	196.0
W.P. Kuala Lumpur	7,212.9	99,981	3,366.1	33.7	72.1
Sabah	6,744.7	68,059	1,489.2	21.9	99.1
W.P. Labuan	1,170.0	2,920	150.9	51.7	400.7
Kelantan	1,034.3	21,410	376.5	17.6	48.3
Perlis	807.4	6,362	145.8	22.9	126.9
W.P. Putrajaya	0.7	34	0.5	16.1	20.9
Total	**294,043.8**	**2,214,883**	**74,880.6**	**33.8**	**132.8**

Source: Penang Institute estimates based on data from Annual Economic Statistics (Manufacturing) 2018, Department of Statistics, Malaysia.

Malaysia's manufacturing firms created an average of RM5.9 billion of value-added to the economy in 2017. Table 3.4 shows that Penang ranked second in total value created by manufacturing industries in Malaysia; this is closely followed by Johor. Penang created about RM41 billion worth of value from its intermediate input, with its gross output valued at RM180.7 billion and intermediate input at RM140 billion in 2017.

Looking at Malaysia's top manufacturing states—Selangor, Penang, and Johor—Penang recorded a larger average value-added per employee than

Selangor, even though the latter produced the highest sum of value-added in Malaysia[25]. With 4,526 establishments responding to the Survey of Manufacturing Industries conducted by the Department of Statistics Malaysia, an average of RM9 billion worth of value was generated by each manufacturing firm within Penang, compared with RM7.9 billion of value created by each firm from a total of 10,432 firms in Selangor (Figure 3.8). We can infer that Penang's manufacturing industry is generally of high value, more capital-intensive, and less low-skilled-labour intensive.

Figure 3.8 Average value-added generated by manufacturing firms in Malaysia (RM million), 2017
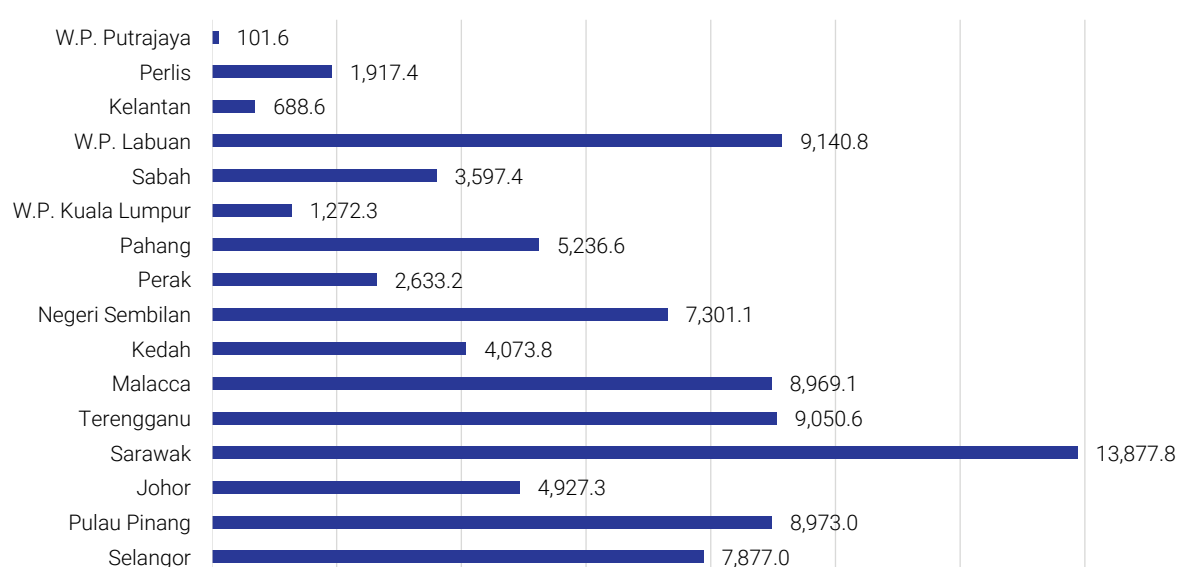
Source: Penang Institute estimates based on data from Annual Economic Statistics (Manufacturing) 2018, Department of Statistics, Malaysia.

With regards to states with a high concentration of medium and high-tech manufacturing industries, Penang surpassed Selangor, Johor, and Kedah with RM141,000 of value generated by each employee. This indicates that the Penang workforce is involved in relatively high value-added operations.

Meanwhile, firms in Selangor accounted for the highest sum of salaries and wages paid to their employees in the manufacturing industries. However,

Table 3.4 shows that while Selangor's manufacturing firms spent almost twice as much as those in Penang, the average salaries and wages paid in Penang were RM42,200 compared with RM36,300 in Selangor, followed by RM29,100 in Johor and RM31,000 in Kedah. This indicates that workers who are engaged in manufacturing firms in Penang are compensated well above those in Selangor, Johor, and Kedah.

[25] In terms of value created by each worker, Terengganu had the highest value-added created, followed by Labuan (Table 3.4). This is largely attributed to refining crude oil activities and petroleum products, where the operations are of high value-added.

In 2020, Penang's manufacturing sector is expected to soften despite the expected materialization of investments. According to a study conducted by the Penang Institute, most industries will experience a U-shaped recovery from the pandemic—except the textile industry, which is likely to face an L-shaped recession—where the downturn is expected to continue for years. Since US and European countries are still enduring the pandemic, demand for manufactured goods, particularly E&E products, may be severely affected in the second half of 2020. Coupled with geopolitical tensions between the United States and China and the upcoming US general election, the employment situation may further deteriorate.

3.2 Services sector

3.2.1 Transportation and logistics

The success of Penang's logistics industry is heavily dependent on the state's transportation system. The former relies on the latter in order to play its role as a significant contributor to Penang's economic output, serving as a crucial enabler for the other industries which make up the backbone of state-wide economic activity.

The logistic industry makes significant direct contributions to the services sector. In 2017, it added RM5.3 billion to the state GDP, or 13.8% of Penang's total service sector output. The availability of an airport (the Penang International Airport, or PIA), seaports (the North Butterworth Container Terminal, or NBCT, and the Butterworth Deepwater Wharves, or BWCT), and road and rail networks allows the logistics industry to serve important support functions for the growth of other key industries in Penang.

Land

The Penang Transport Master Plan (PTMP) represents a crucial component of Penang's modernisation drive. Once completed, it will alleviate the growing issue of traffic congestion across the state, as well as enhance connectivity, accessibility, and liveability in Penang. Additionally, some of the projects under the PTMP will have positive effects for the state's logistics industry, which in turn will benefit the industries reliant on it. The PTMP's emphasis on public transport projects in the form of light rail transit (LRT), bus rapid transit (BRT), monorail, and tram services will serve to reduce the modal share accruing to private transport, currently estimated at over 95%. It achieves these goals primarily by providing the framework for a comprehensive and integrated transport system which enhances both land- and sea-based connectivity across Penang. The projects under the scope of the PTMP are listed in Table 3.5 below, and cover both public transport systems and new roads and highways, both on Penang Island and in Seberang Perai. Figure 3.9 provides a map of these projects.
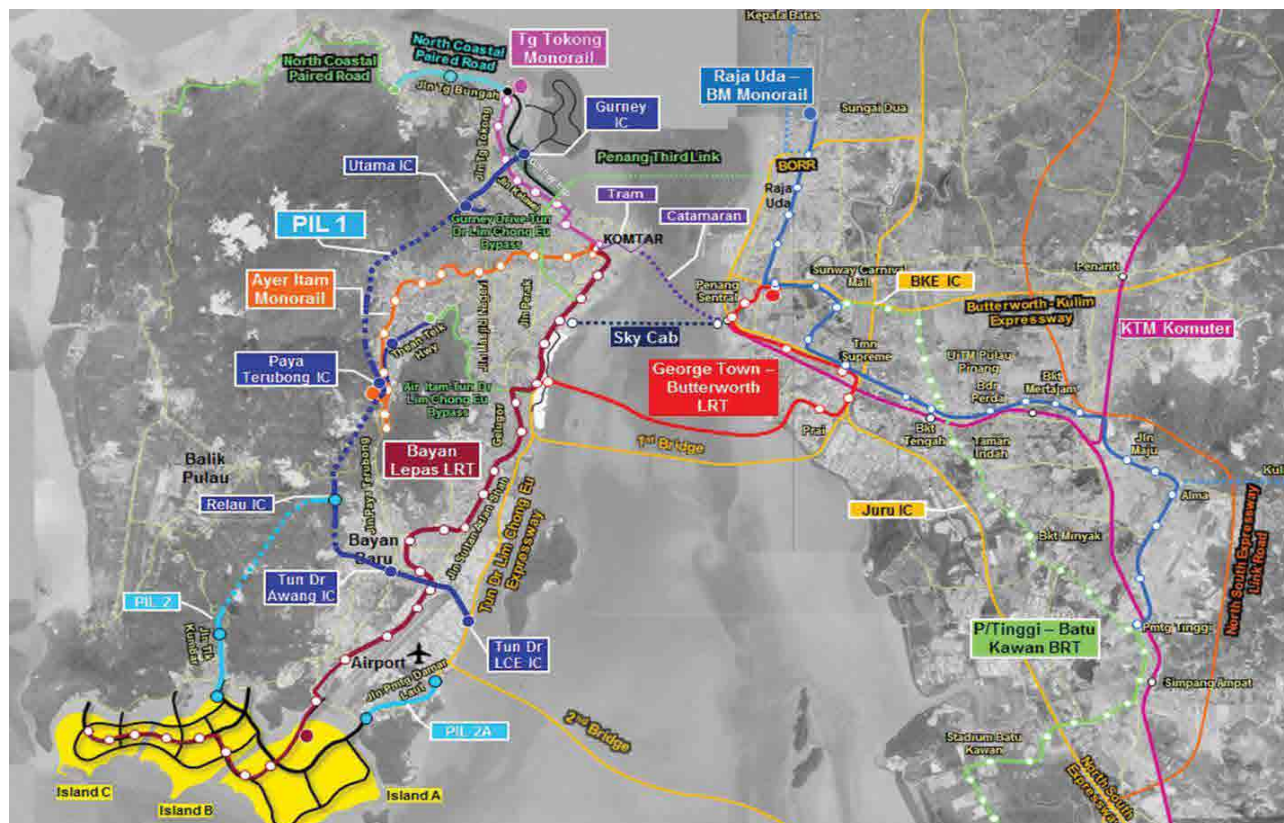
Table 3.5 Projects under the Penang Transport Master Plan

Confirmed projects	Category	Length	Location
Bayan Lepas LRT	Public Transport	30km	Island
Georgetown–Butterworth LRT		18km	Island–S.P
Ayer Itam Monorail		13km	Island
Tanjung Tokong Monorail		7km	Island
Raja Uda–Bukit Mertajam Monorail		28km	S.P
Permatang Tinggi–Batu Kawan BRT		14km	S.P
George Town Tram Line		2km	Island
Pan Island Link 1	Highways	20km	Island
Pan Island Link 2		TBC	Island
Pan Island Link 2a		TBC	Island
North Coast Paired Road	Roads	15km	Island
Butterworth–Kulim Expressway Interchange		TBC	S.P
Juru Interchange		TBC	S.P
Unconfirmed projects	**Category**	**Length**	**Location**
Permalang Pasir–Perda link	Roads	7km	S.P
Bukit Minyak links		2km	S.P
Penang Third link	Undersea Tunnel	7km	Island–S.P

Note: SP denotes Seberang Perai
Source: Compiled from Penang Transport Master Plan (2019)

Figure 3.9 Map of PTMP projects

Source: Penang Transport Master Plan, retrieved from http://pgmasterplan.penang.gov.my/en/2019/07/ptmp-keseluruhan/

Priority projects under the PTMP are the Pan Island Link 1 (PIL1) and the Bayan Lepas LRT (BL-LRT). The former is a 20km highway linking the Gurney Interchange on the island's northeast to the Tun Dr Lim Chong Eu (LCE) Interchange, close to both PIA and the Penang Second Bridge. PIL1 is expected to alleviate traffic chokepoints along the LCE Expressway and its adjacent roads, including Jalan Tun Dr Awang and Jalan Sultan Azlan Shah, and in doing so shorten north-south travel times by 67% while improving accessibility to George Town, Paya Terubong, Bayan Baru, and Relau.

The BL-LRT, meanwhile, covers a distance of 29.5km and tentatively consists of 27 stations from Komtar in the north of Penang Island and ending in the upcoming Penang South Reclamation (PSR) Smart City. Additionally, the LRT will pass through high-demand areas such as Macallum, Jelutong, University Sains Malaysia, the Bayan Lepas Free Industrial Zone, and Penang International Airport, providing benefits to both the local population and tourists alike. At the same time, shifting traffic from private road transport to mass transport can mitigate greenhouse gas emissions significantly and contribute to the reduction of Penang's carbon footprint.

The George Town–Butterworth LRT and the Penang Third Link, an undersea tunnel connecting Gurney Drive to Seberang Prai, will provide the third and fourth links between Penang Island and Seberang Perai and significantly minimise travel times between the two areas. At the same time, reducing congestion in and around George Town is an important goal that will be helped by the development of the Ayer Itam and Tanjung Tokong monorail services, as well as the George Town tram line. In a state with more cars than inhabitants, these projects play an important role in helping the state government reach its target of achieving a public-private transport modal share of 40:60 over the next decade.

Air

The value of trade in Penang is heavily dependent on the state's airport. This is aided by the proximity of PIA to the Bayan Lepas Free Industrial Zone (BLFIZ), the heart of Penang's E&E industry. Trade value, inclusive of imports and exports, conducted through PIA is three times as large as Penang Port's North Butterworth Container Terminal. PIA accounts for a significant share of external trade conducted through air channels in Malaysia as a whole; it was responsible for approximately 66% (or RM359 billion) of air channel trade value in the country in 2019. This is in contrast with the share of total external trade value by sea accruing to Penang's seaports, which was only 8.9% (or RM90 billion). This suggests that PIA is the main gateway for trade in Penang, and, in turn, is heavily influenced by Penang's status as an E&E hub.

The key reason PIA is a beneficiary of the E&E industry's presence in Bayan Lepas stems from the nature of the industry. Final manufactured E&E goods have time-sensitive supply chains and are lightweight, possessing a high value-to-weight ratio. These characteristics make air transportation an ideal logistical choice for the industry. Given also that these products are manufactured primarily for the purpose of export rather than domestic consumption, these features explain PIA's air-trade dominance and the fact that it outperforms even Kuala Lumpur International Airport (KLIA). It also, however, means that the value of trade conducted through PIA is dependent, to a degree, on international trade developments.

Figure 3.10 Passenger traffic at Penang International Airport, Q1 2017−Q3 2019
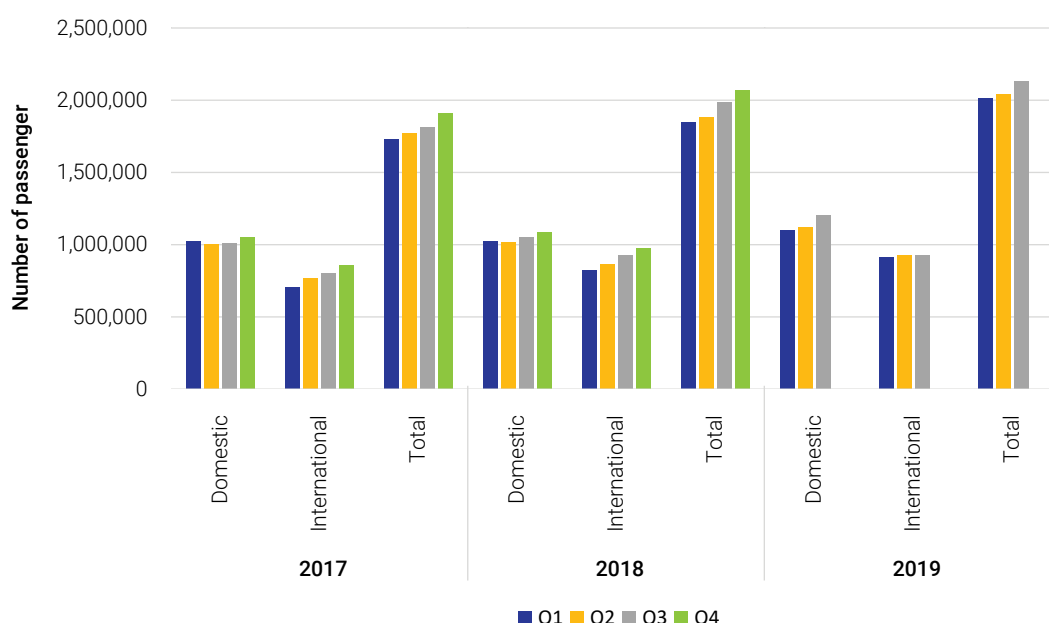
Source: Transport Statistics Malaysia, Ministry of Transport, Malaysia.

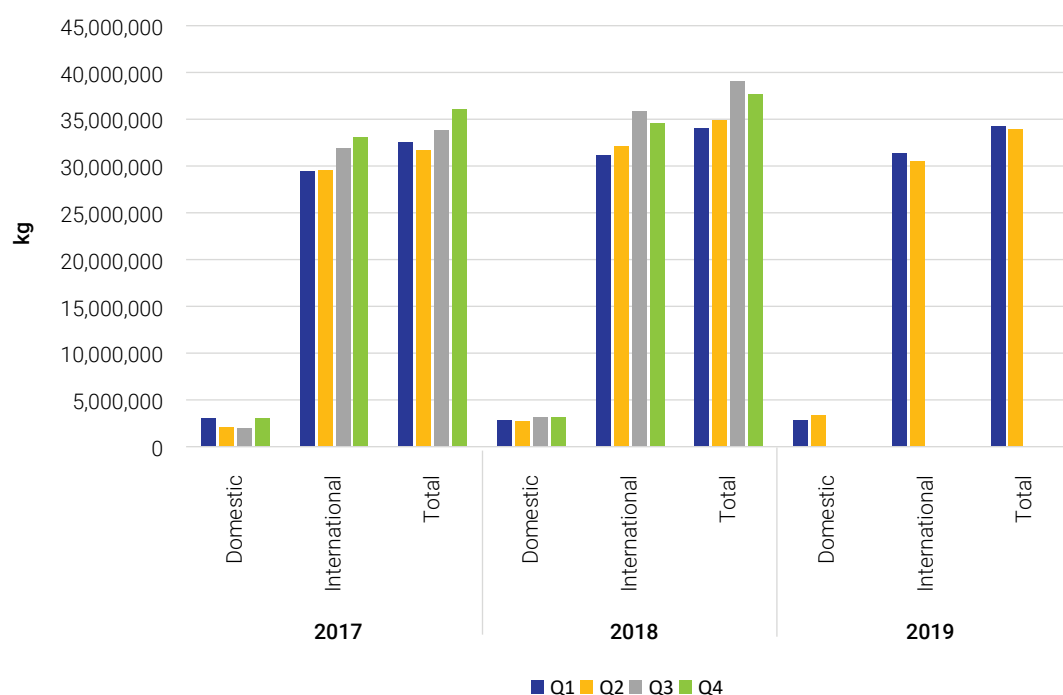**Table 3.6 PIA passenger traffic growth, 2018−19**

	Q1	Q2	Q3
Domestic	7.3%	10.3%	14.3%
International	11.5%	6.6%	-0.1%

Source: Penang Institute estimates based on data from Transport Statistics Malaysia, Ministry of Transport, Malaysia.

Passenger traffic through PIA has shown steady growth since 2017, and evidence from the first two quarters of 2019 suggests the pace of this growth is quickening. Compared with Q1 2018, domestic passenger traffic increased by over 7% in Q1 2019, and international passenger traffic by almost 11.5%. In the second quarter of 2019, domestic passenger traffic rose by over 10% relative to the same period last year, while international passenger traffic saw an increase of just under 7%. Domestic passenger traffic growth was even more rapid in the third quarter, but international passenger traffic showed signs of stagnation. Overall, 2019 has shown record passenger arrivals at PIA. For 2020, however,

air passenger arrivals are expected to be vastly impacted by the global pandemic.

As far as cargo traffic at PIA is concerned, the picture is not as clear, and in terms of international cargo traffic, global trade tensions may be starting to have negative repercussions for Penang. While such traffic remained steady in Q1 2019 relative to Q1 2018, it fell by 5% in the second quarter relative to the same period last year. On a positive note, domestic cargo traffic increased by almost 24% in the second quarter of 2019, compared to 2018, after remaining flat through the first quarter.

Figure 3.11 Cargo traffic at PIA, Q1 2017–Q2 2019

Source: Transport Statistics Malaysia, Ministry of Transport, Malaysia.

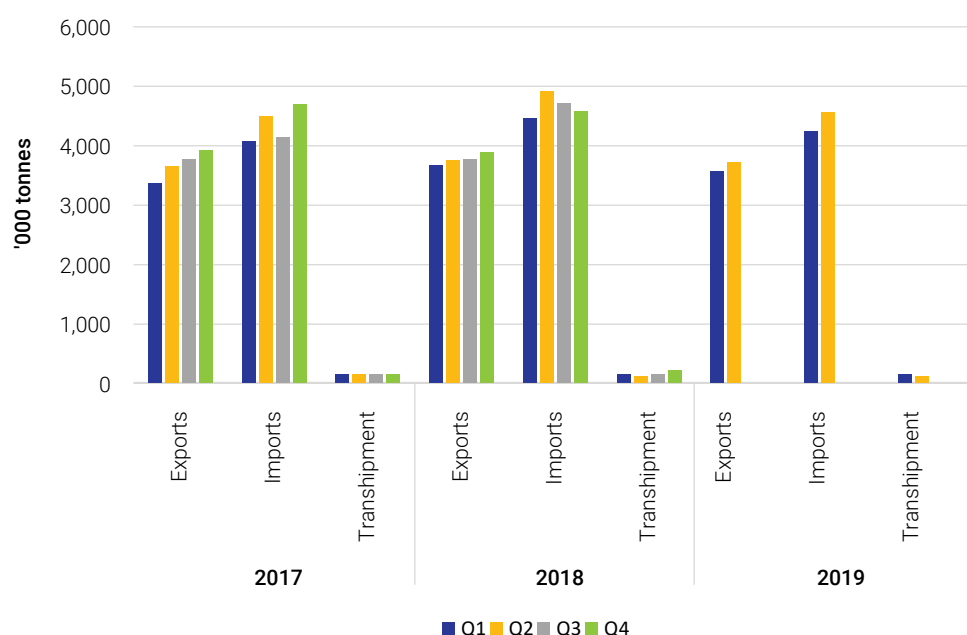**Table 3.7 PIA Cargo traffic growth, 2018–19**

	Q1	Q2
Domestic	-0.8%	23.6%
International	0.7%	-5.0%

*Source: Penang Institute estimates based on data from
Transport Statistics Malaysia, Ministry of Transport, Malaysia.*

Sea

While the E&E sector heavily utilises air transportation as its preferred mode of transport, other industries rely on both sea freight and road transport. This is primarily because of the nature of products and inputs which have lower value-to-weight ratios, as well as less aggressive production cycles. The availability of two key connecting nodes—NBCT and BWCT—have contributed to making Penang a strong choice for manufacturing industries that are more actively engaged in international trade, particularly those with business models that are sensitive to logistical costs.

Figure 3.12 Cargo throughput at Penang Port, Q1 2017–Q2 2019

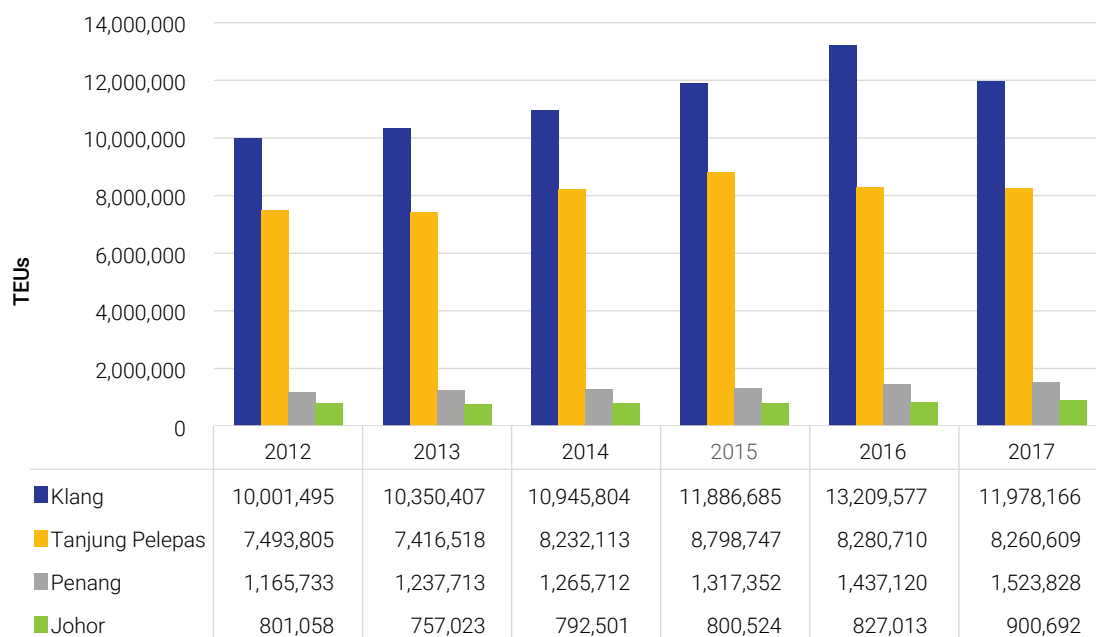*Source: Transport Statistics Malaysia, Ministry of Transport, Malaysia.*

Table 3.8 Penang Port cargo throughput growth, 2018–19

	Q1	Q2
Exports	-2.5%	-0.6%
Imports	-4.6%	-7.0%
Transhipment	-0.7%	-2.3%

*Source: Penang Institute estimates based on data from
Transport Statistics Malaysia, Ministry of Transport, Malaysia.*

Relative to Malaysia's largest seaports, Penang Port lags significantly in terms of total container throughput. Port Klang, the top performer in Malaysia, recorded an annual throughput eight times that of Penang on average between 2012 and 2017. Port of Tanjung Pelepas (PTP) is the nation's second-largest in terms of volume, averaging six times that of Penang over the same six-year period. In 2017, the volume handled at Port Klang was approximately 7.9 times that of Penang Port while the volume of containers in PTP was roughly 5.4 times larger than Penang Port's. Figure 3.13 highlights total container throughput at Malaysia's four major seaports: Klang, Tanjung Pelepas, Penang, and Johor.

Figure 3.13 Top-four performing ports in Malaysia by total container throughput

	2012	2013	2014	2015	2016	2017
■ Klang	10,001,495	10,350,407	10,945,804	11,886,685	13,209,577	11,978,166
■ Tanjung Pelepas	7,493,805	7,416,518	8,232,113	8,798,747	8,280,710	8,260,609
■ Penang	1,165,733	1,237,713	1,265,712	1,317,352	1,437,120	1,523,828
■ Johor	801,058	757,023	792,501	800,524	827,013	900,692

Source: Transport Statistics Malaysia, Ministry of Transport, Malaysia.

Penang Port is commonly categorised within the industry as a feeder port. This understanding is built upon Penang Port's primary function as a port that serves its regional market, i.e., the northern states of Malaysia. This conventional understanding, however, does not paint a wholly accurate picture. In practice, Penang Port also functions as a main port because it has liners that operate direct calls.

Penang Port does not only function as a port that caters to Malaysia's northern states; it is also a port for southern Thailand. The export volume originating from Thailand addresses the empty containers from imports. According to Penang Port Sdn. Bhd., Penang Port currently handles about 70% of the total product market share from southern Thailand, an area that covers 14 provinces in the south of Thailand.

Penang Port's functions varies according to who uses the port and the purpose for which they use it. With its current depth of 11–12m, the port may not be able to accommodate larger ships with higher TEU capacity, which typically require a draft depth of 12–15m or deeper.

Penang Port currently has a free commercial zone (FCZ) at the Butterworth Deep Water Wharves (BWCT), but presently the port has not fully realised the potential of an FCZ. The biggest reason for this is that the FCZ in BWCT is physically separated from NBCT. As NBCT does not have warehouse facilities, NBCT is suited only for full container load (FCL). Currently, traders still need to fulfil customs requirements and travel a distance of roughly 3.5km between NBCT and BWCT in order to utilise the FCZ at the latter. Plans are currently in place to extend FCZ status to the NBCT, which are elaborated upon in Box 3.3.

Box 3.3 Future developments at Penang's seaport

By Darshan Joshi

The current free commercial zone (FCZ) at Penang Port, located at the Butterworth Deep Water Wharves (BWCT), covers an area of 56.6 hectares and was gazetted in June 1996. The wharves encompass six berths, each with a depth of between 11 and 12m, and a land area of approximately 67 hectares with a storage capacity of 2,270,084 TEUs. Meanwhile, yard stacking comprises 6,669 ground slots and the export deck comprises 2,178 ground slots.

Expansions are ongoing at the NBCT, and once completed will culminate in increased capacity at Terminal 1. These upgrades are as follows:
- **Expansion Plan A:** Berth capacity is projected to increase by 194,366 TEUs (from 2.13 million to 2.32 million TEUs) after upgrades are completed. The upgrades involve extending the rear deck and rail gauge from 17m to 30.5m.
- **Expansion Plan B:** An additional increase of 412,530 TEUs (from 2.32 million to 2.74 million TEUs) is projected following the acquisition of two new Quay cranes.

Furthermore, there are plans to install a new FCZ at the NBCT, which is estimated to have a landmass of 83.61 hectares. There are multiple requirements before this can be approved, including the following:

1) Submission to MOF to gazette the NBCT, comprising a total of 83.57 hectares, as an FCZ.
2) Approval from the Penang state government on the appointment of the Penang Port Commission (PPC) as the zone authority.
3) Submission of layout plans to the Department of Survey and Mapping Malaysia (JUPEM) for the gazetting of the FCZ area and a "legal landing place".
4) Support from the Marine Department to gazette the whole NBCT as a legal landing place.

Other facilities required in the FCZ at NBCT are closed-circuit television (CCTV), street lighting, and fencing around the FCZ perimeter.

For the FCZ to realise its full potential and achieve benefits not solely limited to an increase in transhipment activities, land reclamation and dredging are required. This is because the existing area is only sufficient to support an increase in ship traffic and transhipment, but not additional value-added activities such as repackaging, which requires warehouses and distribution centres.

According to a study undertaken by Lee et al. (2020), in order to cater to the needs of large modern ships, landing berths at NBCT must be deepened. It is expected that 217 hectares of land will be reclaimed, consisting of:

1) A 65-hectare container yard. This is estimated to increase yard capacity by 2.38 million TEUs from the current 2.13 million TEUs.
2) A 22-hectare halal hub. An estimated gross development area of 250,000m2 will be available for warehousing.
3) A 130-hectare distribution park. An estimated gross development area of 1,320,000m2 will be available for warehousing. For this particular segment, Penang Port aims for the area to be gazetted as a free trade zone and intends to act as its administrator.

Figure 3.14 Existing and proposed reclamation at NBCT

Proposed area to be reclaimed

Existing 26 Ha Reclaimed by RCSB

Source: Google map image and information on reclamation based on information from Penang Port Commission and Penang Port Sdn. Bhd.

Two additional entry and exit points to the NBCT will be constructed to ease traffic congestion and cater to future growth in container volumes. These additional entrances are important; presently, there are numerous issues caused by congestion and inefficiencies related to the process of entering and leaving the NBCT. Spreading traffic across more entry and exit points will be a helpful measure, particularly if container volumes increase as a result of the instatement of the FCZ. There is no definitive timeline for these new entry and exit points, but it is understood that this process should be completed by 2024. Meanwhile, the current berth length (for six berths) at NBCT is 1.5km. Penang Port plans to double this length to 3km. It is projected that, with this future design in place, the container terminal will have the capacity to handle a total of 7.5 million TEUs.

3.2.2 Water and electric power demand and supply

Water

Since 2010, water consumption has been increasingly steadily in Penang, although at a rate slower than that water production. This is expressed by Figure 3.15 and Table 3.9. Overall, growth in water production was 12.1% between 2010 and 2018, while consumption rose by just 7.4%. As Figure 3.16 shows, much of this growth occurred because of an increase in industrial water use across the state, predominantly in Seberang Perai. Here, water consumption rose from 66.4 billion litres to 71.2 billion litres between 2015 and 2018, compared with an increase of roughly 2.2 billion litres on Penang Island. Domestic water consumption on the island remained fairly constant over this four-year period and increased by just 2.5 billion litres in Seberang Perai.

**Figure 3.15 Water production, consumption and excess capacity in Penang, 2010–18**
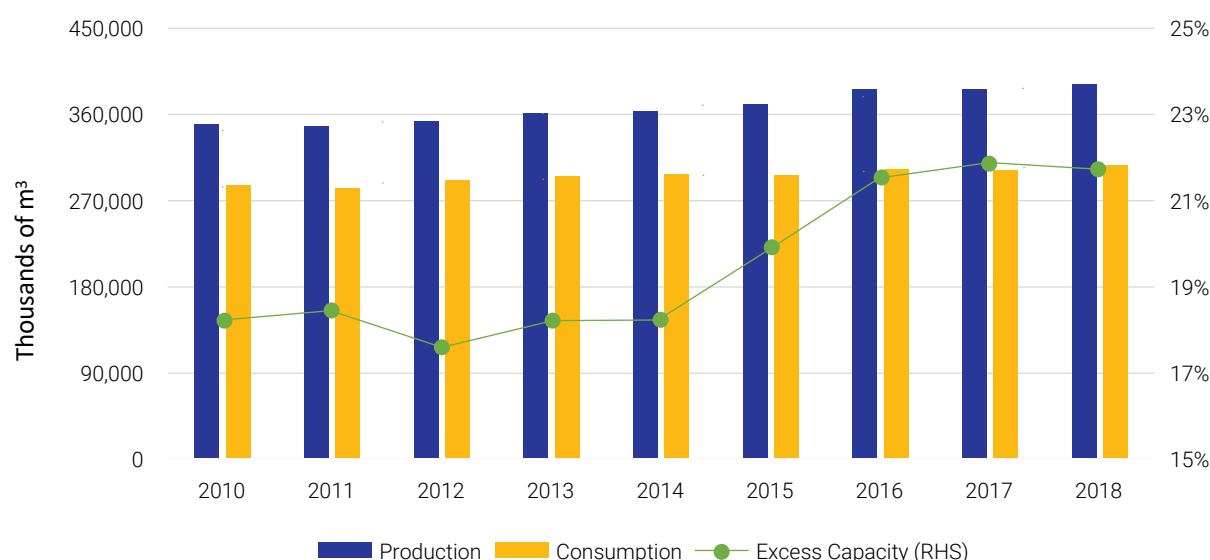
Source: Penang Water Supply Corporation (PBAPP).

Table 3.9 Year-on-year growth in water production and consumption in Penang

Year	Production	Consumption
2011	-0.63%	-0.85%
2012	1.62%	2.64%
2013	2.25%	1.54%
2014	0.69%	0.61%
2015	1.95%	-0.08%
2016	4.15%	2.01%
2017	0.11%	-0.33%
2018	1.45%	1.64%
2010−18	12.12%	7.35%

Source: Penang Water Supply Corporation (PBAPP).

**Figure 3.16 Water consumption by sector in Penang, 2015–18**
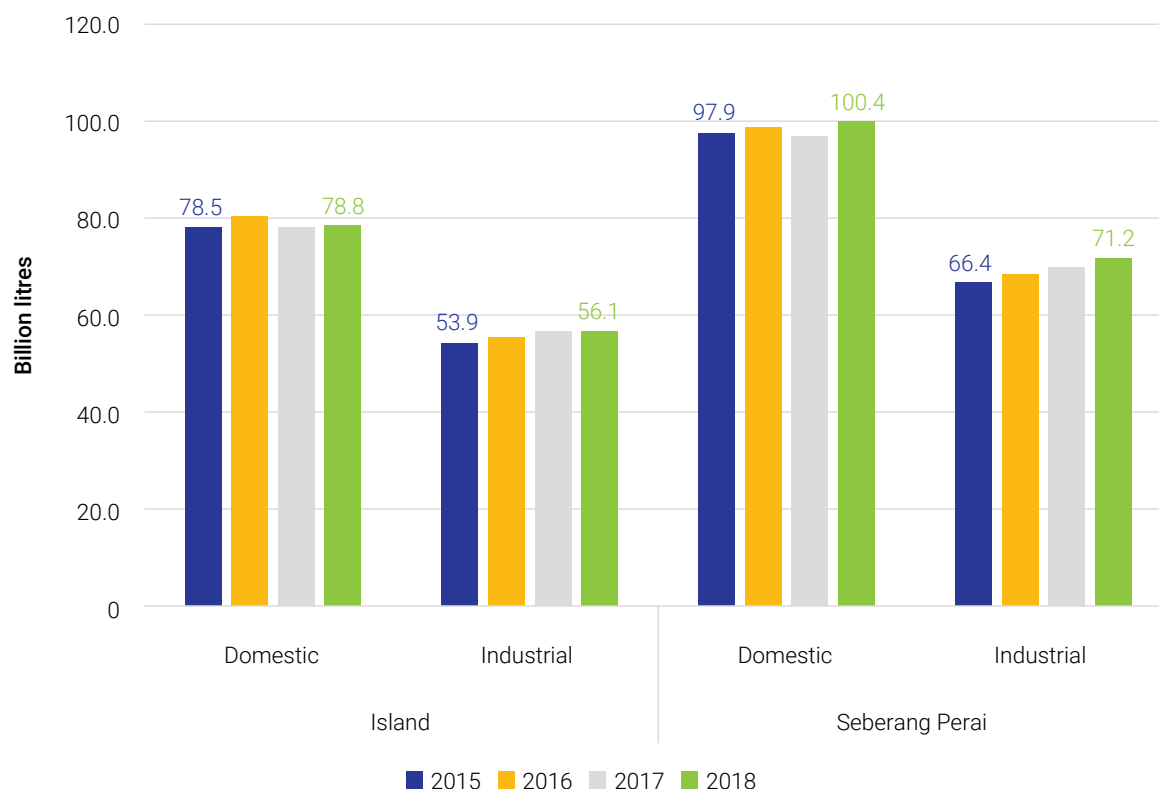
Source: Penang Water Supply Corporation (PBAPP).

Electricity

Penang enjoys a large amount of excess electricity capacity; since 2006, the reserve margin has not dipped below 50%, and since 2017 has exceeded 65% (Figure 3.17). In contrast, the national reserve margin was only around 30% in 2018. This was driven by a 36% increase in Penang's installed electricity capacity, rising from 3,456MW in 2016 to 4,680MW in 2017, and 4,710MW in 2018. Meanwhile, maximum electricity demand—which rose by over 25% between 2006 and 2014—slowed to an average annual growth rate of just 7.1% between 2014 and 2018 (Table 3.10).

The presence of a large reserve margin in Penang could allow for the state utility company to decommission older—and more polluting—fossil fuel power plants

without threatening the stability of Penang's electricity system. Additionally, the government should encourage the adoption of renewable energy, particularly rooftop and large-scale solar, in order to further reduce greenhouse gas emissions associated with electricity generation in Penang. In 2016, renewable energy contributed only 14.67MW (0.4%) of the state's total electricity generation capacity of 3,456MW. This renewable energy came in the form of solar energy, which will enjoy a further 23.7MW boost to capacity once the approved large-scale solar (LSS) plant in Seberang Perai is operational. This figure, however, can and should be improved upon with a greater emphasis on solar, as well as biogas and biomass in the coming years.

Figure 3.17 Electricity supply, demand and excess capacity in Penang, 2006−18
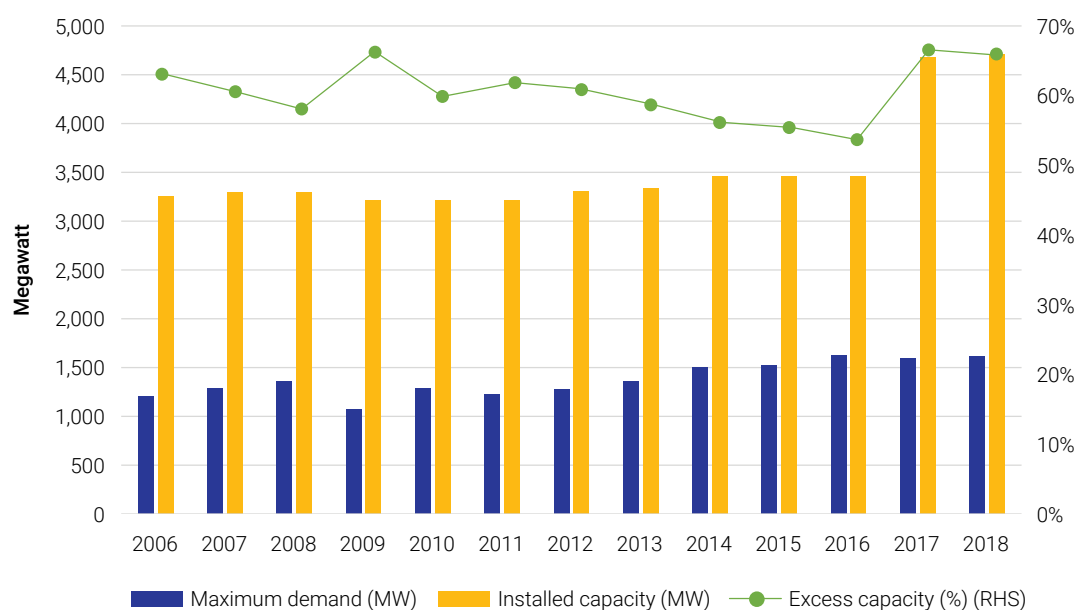
Source: Tenaga Nasional Berhad (TNB).

Table 3.10 Annual growth in electricity demand and capacity in Penang, 2006−18

Year	Maximum demand	Capacity
2007	6.8%	1.2%
2008	6.0%	0.0%
2009	-21.1%	-2.5%
2010	19.5%	0.0%
2011	-4.1%	0.0%
2012	4.1%	2.8%
2013	6.3%	0.9%
2014	10.9%	3.7%
2015	1.1%	0.0%
2016	6.4%	0.0%
2017	-1.7%	35.4%
2018	1.3%	0.6%
2006−14	25.5%	6.2%
2014−18	7.1%	36.3%
2006−18	34.4%	44.7%

Source: Tenaga Nasional Berhad (TNB).

3.2.3 Global business services

The digital revolution has advanced business services by leveraging modern technologies into their operations. Artificial intelligence (AI), robotic process automation (RPA), cloud storage, big data, and block chain are seamlessly turning business operation models into a connected ecosystem to generate maximum value across the value chain. As the next GBS hub outside Kuala Lumpur, the GBS Focus Group (GFG) Penang Chapter was established in May 2019 and acts as a platform for industry players to share information and ideas, as well as to discuss concerns and challenges related to the industry (InvestPenang, 2019).

Penang is home to over 60 GBS companies, creating more than 12,000 high-value jobs in the areas of business processing, advanced knowledge processing, and information technology solutions. This has partially contributed to the rise of Penang's services sector, where the sector's share increased by 9.4 percentage points to 50.6% in 2018 from 41.2% a decade ago. In Penang, about one-third of its GBS companies have set up their manufacturing footprints for at least 20 years. These companies include B.Braun, Intel, Jabil, Motorola, and Osram. (InvestPenang, 2019).

While a few traditional business processing outsourcing (BPO) providers have established operations in Penang over the past 20 years, some business services have gone further by adopting intelligent operations through digitisation in recent years. Ranked second after Kuala Lumpur for its GBS investment hub, ICT and software development, and creative multimedia are two advanced services that recently gain international investing traction in Penang. Many MNCs involved in various type of services such as information technology and software development, as well as research and analytics, have established their advanced business services here, including UST Global, IHS Markit, and Clarivate[26].

For new GBS establishments, the guidelines for MSC Malaysia's financial incentives have been revised by the Malaysia Digital Economy Corporation (MDEC) effective 1 January 2019 as a result of Malaysia's participation in the Forum on Harmful Tax Practices (FHTP). In association with the Organisation for Economic Cooperation and Development (OECD) and the G20 countries, the new conditions would address issues on base erosion and profit shifting (Table 3.11). The MSC Malaysia status requirements have also been updated to incentivise the promotion of modern technologies and Industry 4.0 that are at the core of the digital revolution.

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[26] A knowledge intelligence provider announced in July 2020, where the global business centre will provide world-class services to its customers worldwide from Penang (Acrofan, 2020).

Table 3.11 Selected incentive package and conditions under revised MSC Malaysia status guidelines for new establishments

MSC Malaysia status company	Tier 1	Tier 2	Tier 3
Percentage of income tax exemption	100%		70%
Exemption period	Five years		Five years
Extension of exemption period	Five years		May apply for extension provided that the company changed to Tier 1 or Tier 2 and fulfils the conditions imposed

Condition	Tier 1	Tier 2	Tier 3
To be complied with by the end of Year 2 from the commencement date of the exemption period and thereafter during the exemption period:			
Paid-up capital	RM500,000 (*minimum amount paid up capital needs to be increased to RM2.5million for the extension of exemption period for the second five-year period)		RM250,000
Full-time employees (comprising knowledge workers) with monthly base salaries	(i) 50 full-time employees with a monthly base salary of RM5,000; or (ii) 30 full-time employees with a monthly base salary of RM10,000 Data centre: Five full-time employees with a monthly base salary of RM5,000		(i) 30 full-time employees with a monthly base salary of RM5,000; or (ii) 20 full-time employees with a monthly base salary of RM8,000
Annual operating expenditure and investment in fixed asset	RM3.5 million Data centre: RM10 million		RM1 million
Percentage of Malaysian knowledge workers	70%		50%

Source: Malaysia Digital Economy Corporation (MDEC, 2019). Guidelines on MSC Malaysia Financial Incentives (Grandfathering and Transition under Services Incentives).

In order to create a high-income nation, creating high-value jobs by setting a minimum salary is important. In 2017, the average salary and wages paid within Penang's ICT industry was RM2,454, while that in Selangor was RM4,922 (Department of Statistics Malaysia, 2018a). Given the different lifestyles and standard of living—one which Penang is better known for—Penang has the advantage of having higher benchmarked salaries. It is expected that more knowledge workers will be attracted to Penang while taking non-salary measurements into consideration since city liveability can be an attractive pull factor. Nevertheless, the hiring of foreign knowledge workers must be allowed only when the company cannot obtain the required skillsets locally. Additionally, the salary bands proposed by MDEC would need fine-tuning at the state level, and must be based on years of experience and level of skill. For example, an experienced SAP functional analyst should be given a reasonable salary compared with the average salary offered in Kuala Lumpur.

In Penang, high demand for talent equipped with high proficiency in the latest software persists. According to Mr Kim Chin Kuang, vice-president of GBS Jabil Circuit, GBS operations require a location with access to an abundance of skilled and multi-lingual talent pool to work closely with teams in other parts of the world. Penang fits this criterion. In terms of technical proficiency, foreign knowledge workers play an important role in knowledge transfer. As mentioned in Section 2.6, the state imported 1,725 foreign workers in 2019, up 16.9% from 1,476 persons in 2018. Of this, about 89% worked in GBS in 2019 (Figure 2.17).

For GBS companies that are already in Penang, the immediate future appears to be dedicated to the pressing shift towards digitisation. This changing landscape focuses on delivering services through digital value-added analytics and automation, with a general preference away from the "shared services" moniker in favour of "integrated business/technology services"—the latter reflecting the critical role IT plays in automated services delivery. As the chairman of GFG Penang Chapter, Mr Kim believes that the new conditions set by MDEC will encourage companies to leverage on digitized operations that will improve the efficiency, effectiveness, and accuracy of companies' day-to-day operations, including existing back-end operations, as well as increasing the hiring of knowledge workers.

The GBS industry in Penang should not only facilitate everyday transactions, but also offer a broader perspective through value-added consulting and advisory services. To enable this, leveraging new technologies such as predictive analytics and big data must be done in tandem with diversifying the workforce. While on-the-job learning and continuous upskilling and reskilling are crucial for the GBS workforce, the task of ensuring a long-term supply of strong talent needs to start with the national education system. By providing opportunities to the younger generation to be exposed in the fields of programming, designing, and developing software, the foundation for the next generation of workers can be laid.

GBS Jabil Circuit has been collaborating with Universiti Sains Malaysia (USM) to train their employees to be citizen data scientists—people who generate models that leverage predictive or prescriptive analytics, but whose primary jobs are not in statistics and analytics (The Apex, 2019). This is to ensure that existing employees stay up-to-date with new technologies, processes, and requirements. They also work with partners such as MDEC, InvestPenang, TalentCorp, and the Northern Corridor Implementation Authority (NCIA) on different programmes to support their employees in transitioning to the new economy and marketplace.

With the shift towards digitisation, GBS companies find themselves playing a more strategic and technical role within their parent companies rather than merely function as a business unit. This is because of the massive amount of critical data about the organisations and their operations that are collected by GBS units. In order to realise this potential, GBS companies require skills in the area of AI, automation, and analytics. However, this future-ready talent is still in short supply in Penang and Malaysia.
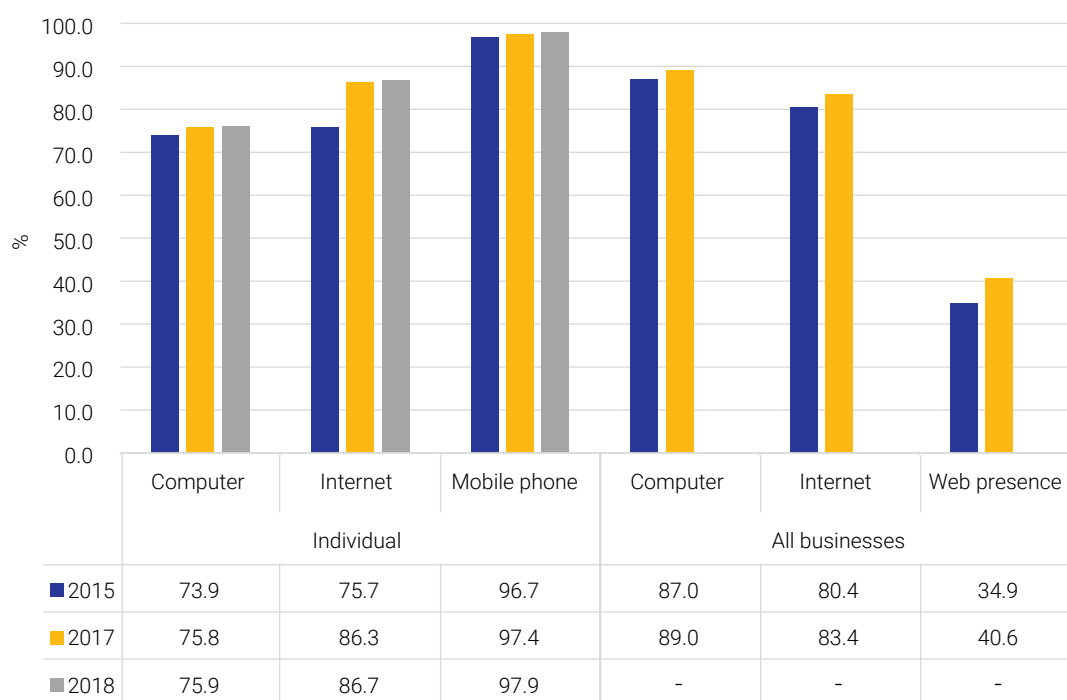
To accelerate the growth of the GBS industry, the Penang state government is establishing conducive office space and infrastructure for new GBS establishments. The Penang Development Corporation (PDC) will continue to study the need for more GBS facilities in other locations (The Star, 2020a). One such GBS office space is GBS@Mahsuri in Bayan Baru which is 80,000 sq ft and two storeys high. All office spaces have reportedly been fully booked, and tenants include companies like Clarivate (The Star, 2020b).

3.2.4 Information and communication

ICT usage among individuals and business establishments has been on an upward trend since 2015. As of 2018, at least 86.7% of Penang's population are connected to the internet (Figure 3.18). Computer usage and mobile phone usage also reached a four-year high of 75.9% and 97.9%, respectively. Likewise, the digital adoption in the business sector is also considered high: 89% of businesses conduct their operations with computers while 83.4% of businesses utilise the internet. Web presence, however, is significantly lower despite an improvement from 34.9% in 2015 to 40.6% in 2017.

Figure 3.18 Percentage of ICT usage by individuals and business establishments in Penang, 2015, 2017, and 2018

	Individual			All businesses		
	Computer	Internet	Mobile phone	Computer	Internet	Web presence
2015	73.9	75.7	96.7	87.0	80.4	34.9
2017	75.8	86.3	97.4	89.0	83.4	40.6
2018	75.9	86.7	97.9	-	-	-

Source: Malaysia Digital Economy 2018, Department of Statistics, Malaysia.

Penangites are seen to be highly connected, as broadband subscription rates sat at 151.5 subscriptions per 100 inhabitants in Q3 2019, signifying that the average person had registered for more than one subscription. Despite this, the internet speed in Penang is below average. In fact, Penang had the lowest average download speed for mobile broadband in Malaysia during the second half of 2019. Surprisingly, internet speeds for developed states such as Johor, Selangor, Kuala Lumpur, and Putrajaya are only middling (Table 3.12), with speeds slower than less-developed states such as Pahang and Terengganu.

Table 3.12 Average download and upload speed of mobile broadband by state, H2 2019

State	Average download speed (Mbps)	Average upload speed (Mbps)	Fastest service provider (based on download speed)
Pahang	26.83	12.69	Maxis
Labuan	25.27	12.65	Maxis
Perak	24.89	11.86	Maxis
Terengganu	24.57	12.15	Maxis
Negeri Sembilan	24.32	11.52	Maxis
Sarawak	24.29	11.78	Maxis
Kelantan	23.84	10.95	Maxis
Johor	23.38	12.03	Maxis
Selangor	23.29	11.67	Maxis
Sabah	22.96	12.14	Maxis
Kuala Lumpur	22.84	12.24	Maxis
Malaysia	22.75	11.79	Maxis
Putrajaya	22.49	11.99	Maxis
Kedah	20.85	11.41	Maxis
Malacca	20.67	11.68	Maxis
Perlis	19.84	11.18	Digi
Penang	19.31	11.70	Maxis

Note: The comparison is based on 4G speeds only; 3G is excluded. The average speed for a state is the simple average of speed reported by five ISPs, namely Celcom, Digi, Maxis, Unifi, and U Mobile in the state.
Source: Mobile Broadband Self-Declaration Report, Malaysian Communications and Multimedia Commission (MCMC), H2 2019.

As for fixed broadband speeds, the actual download speeds enjoyed by Johor, Kuala Lumpur, and Selangor were higher than the advertised speed, where their average speeds exceeded 100% of the subscribed packages (Table 3.13). Penang's speeds were the lowest among similarly developed states. Maxis is by far the fastest internet service provider (ISPs) for mobile broadband, while TT dotcom (TIME) has the best speeds for fixed-line internet. However, TIME's coverage is still limited. A significant number of residential housing areas (with low rise houses) in Penang are still unable to enjoy internet speeds provided by TIME as the company focuses on high-rise buildings.

Table 3.13 Average download and upload speed of fixed broadband by state, H2 2019

State	Average download speed (%)	Average upload speed (%)	Fastest service provider (based on download speed)
Johor	101.08	96.08	TIME
Kuala Lumpur	100.37	97.40	TIME
Selangor	100.36	96.76	TIME
Negeri Sembilan	99.82	96.43	TIME
Putrajaya	99.76	96.20	TM
Malaysia	99.72	96.12	TIME
Malacca	99.45	97.01	TIME
Penang	98.90	95.96	TIME
Sarawak	97.43	92.11	TM
Sabah	95.21	92.84	TM
Kedah	95.11	93.27	TM
Perak	94.89	93.67	TM
Terengganu	94.60	94.78	Maxis
Perlis	94.58	95.36	Maxis
Pahang	93.64	93.23	Maxis
Kelantan	90.66	93.87	Maxis

Note: Internet speed is expressed as the percentage of the subscribed packages. The average speed for a state is the simple average of speed reported by three ISPs, namely TM, Maxis, and TT dotcom (TIME). The data for Maxis is not available for Putrajaya while data for TIME is only available for Johor, Kuala Lumpur, Selangor, Negeri Sembilan, Malacca, and Penang.
Source: Wired Broadband Self-Declaration Report, Malaysian Communications and Multimedia Commission (MCMC), H2 2019.

Table 3.14 gives an insight into how businesses in Malaysia utilise the internet. While the share of businesses using the internet has increased significantly in 2017 for all purposes, the top-three uses identified are sending or receiving email (92.1%), internet banking (70.9%), and getting information about goods and services (67.3%). The only other purpose of usage reaching more than 50.0% engagement would be posting information or instant messaging (65.6%). On the lower spectrum of usage, only 14.6% of businesses used the internet to access other financial services (besides internet banking). The other two purposes with the lowest percentage of usage would be delivering products online (13.5%) and staff training (8.9%).

Table 3.14 Share of total business establishments in Malaysia by Internet usage, 2015 and 2017

Use of internet	2015 (%)	2017 (%)
Sending or receiving email	70.6	92.1
Internet banking	41.3	70.9
Getting information about goods or services	38.9	67.3
Posting information or instant messaging	36.6	65.6
Getting information from government organisations	23.5	40.5
Interacting with government organisations	16.5	32.5
Providing customer services	10.3	29.6
Telephoning over the internet	18.6	25.8
Internal or external recruitment	10.8	22.1
Accessing other financial services	9.9	14.6
Delivering products online	5.7	13.5
Staff training (e-learning application)	2.5	8.9
Others	12.5	19.0

Source: Malaysia Digital Economy 2018, Department of Statistics, Malaysia.

It is anticipated that the percentage of businesses using the internet for delivering products may increase during the COVID-19 pandemic. There has been an increase in small businesses switching platforms owing to the MCO, with some stating that it was necessary for the survival of their businesses (Zikri, 2020). Food businesses, including hawkers, have also started utilising the internet to deliver their products as demand for food deliveries surged. In Penang, the Penang Island City Council had launched JomBeli, an online delivery platform that catered towards the state's hawkers in hopes of increasing efficiency and sustaining their businesses during the pandemic (Dermawan, 2020).
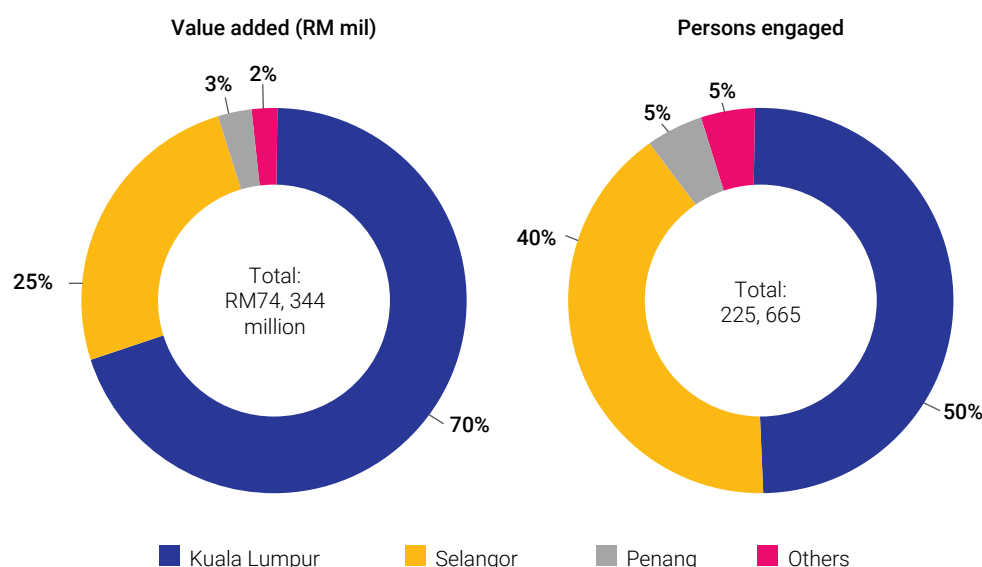
A consistent, reliable, and fast internet connection is the key enabler to the digital economy. In 2018, the government implemented a new Mandatory Standard on Access Pricing (MSAP) to provide Malaysians with an internet connection at higher speeds and lower prices. Furthermore, a five-year National Fiberisation and Connectivity Plan (NFCP) was launched to improve the digital connectivity in the country, along with various 5G initiatives such as 5G Malaysia Showcase and 5G Demonstration Projects.

The value-added of Penang's ICT sector has grown significantly by 37.1% per year, from RM219 million in 2010 to RM1.995 billion in 2017 (Figure 3.19). In 2017, the sector produced a gross output of RM4.3 billion while engaging 11,170 persons. The ICT sector includes the following activities:

i. Motion picture, video, and television programme production; sound recording; and music publishing
ii. Programming and broadcasting;
iii. Telecommunication services;
iv. Computer programming, consultancy, and related activities; and
v. Information services.

Figure 3.19 Value added and number of persons engaged in ICT sector in Penang, 2017

Value added (RM mil)

Persons engaged

3% 2%

5% 5%

25%

40%

Total:
RM74, 344
million

Total:
225, 665

70%
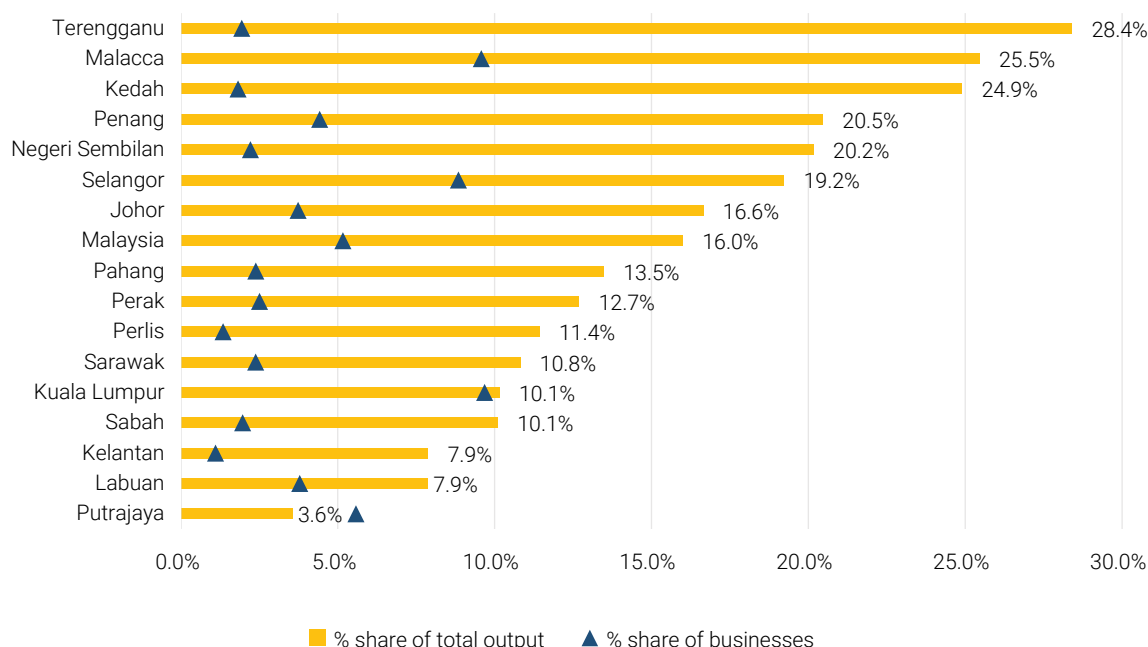
50%

■ Kuala Lumpur ■ Selangor ■ Penang ■ Others

Source: Malaysia Digital Economy 2018, Department of Statistics, Malaysia.

The major ICT activities in Penang are computer programming, consultancy, and related activities (Department of Statistics Malaysia, 2017). Despite the rapid growth, there is still great potential for the ICT sector in Penang as it only constituted about less than 4% of the total value-added of the ICT sector in Malaysia (Figure 3.19).

Figure 3.20 Share of business establishments involved in e-commerce and share of income to gross output by state, 2015

State	% share of total output
Terengganu	28.4%
Malacca	25.5%
Kedah	24.9%
Penang	20.5%
Negeri Sembilan	20.2%
Selangor	19.2%
Johor	16.6%
Malaysia	16.0%
Pahang	13.5%
Perak	12.7%
Perlis	11.4%
Sarawak	10.8%
Kuala Lumpur	10.1%
Sabah	10.1%
Kelantan	7.9%
Labuan	7.9%
Putrajaya	3.6%

■ % share of total output ▲ % share of businesses

Source: Usage of ICT by businesses and e-commerce, Economic Census 2016 and SMEs, Department of Statistics, Malaysia.

Income generated by e-commerce has accounted for a significant share of total revenue of all businesses despite the relatively low involvement[27]. Interestingly, e-commerce has contributed larger share of income to total revenue for businesses in less-developed states such as Terengganu and Kedah, compared with Selangor, Johor, and Kuala Lumpur, indicating the important role of e-commerce as a main income source for businesses in the aforementioned states (Figure 3.20). In fact, Terengganu held the biggest percentage share of total output at 28.4%, while Kuala Lumpur ranked fifth from the bottom at 10.1%. Although only 4.4% of Penang's business establishments were involved in e-commerce during the period, the state held a 20.5% share of total output generated, ranking it fourth overall in the country.

Figure 3.21 Income and expenditure of e-commerce in Penang, 2015 and 2017
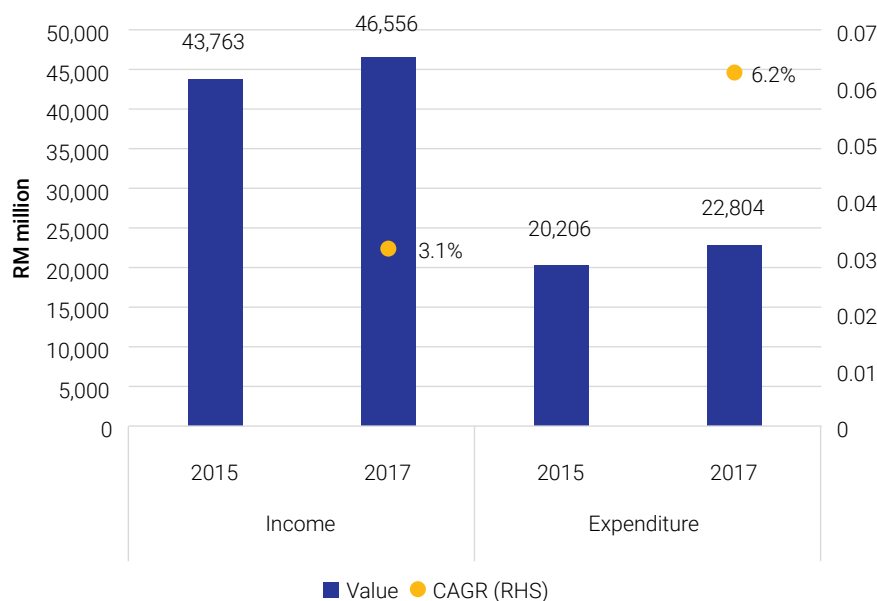
Source: Malaysia Digital Economy 2018, Department of Statistics, Malaysia.

In 2017, e-commerce income in Penang amounted to RM46.6 billion, an increase of 3.1% per year from 2015 (Figure 3.21). Meanwhile, businesses spent RM22.8 billion on e-commerce purchases, constituting almost half of the income, recording a compounded annual growth rate of 6.2%. This signifies that more companies are using e-commerce platforms to conduct their businesses and transactions. As penetration into digital commerce is still considered low, Penang's e-commerce has a lot of room to develop and grow.

3.2.5 Tourism

The tourism sector is a huge contributor to Penang's GDP and economic growth. As one of the most popular tourism destinations in the region and in the world, Penang attracts millions of tourists annually. Its local food, rich mix of cultures and traditions, historic heritage enclaves, and scenic beaches are often cited as the main attractions for tourists. In 2019, Penang was lauded by CNN Travel as one of the best places to visit in Asia (Springer, 2019a)

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[27] The lower-than-expected involvement of e-commerce in businesses might be due to the method of calculation by Department of Statistics Malaysia, where the unit of measurement is the number of establishments instead of enterprises. The share might be undercounted if companies do not perform e-commerce at all establishments (or at least the establishments sampled) (World Bank, 2018).

while George Town was named as one of the most picturesque towns in the region (Springer, 2019b). The international exposure has greatly helped raise Penang's profile among international travellers.

Penang's tourism sector is made up of several sub-sectors, with medical tourism being one of the main sub-sectors that has significantly contributed towards tourism revenue. Other sub-sectors include heritage tourism, eco-tourism, cruise tourism, wedding tourism, education tourism, and meetings, incentives, conferences and exhibitions (MICE) tourism. The tourism industry also plays

a significant role in stimulating economic growth, with the creation of new businesses in the food, retail, and accommodation industries providing more employment opportunities to Penangites. As a spill-over effect, the small business sector will be invigorated by trade, income, and entrepreneurship. However, there are also negative effects to the expansion of the tourism sector, with issues such as gentrification and harm to the environment. Therefore, it is vital to balance the growth and development of the tourism sector so that the industry remains sustainable in the long term.

Figure 3.22 Total arrivals and departures at Penang International Airport, 2018−19
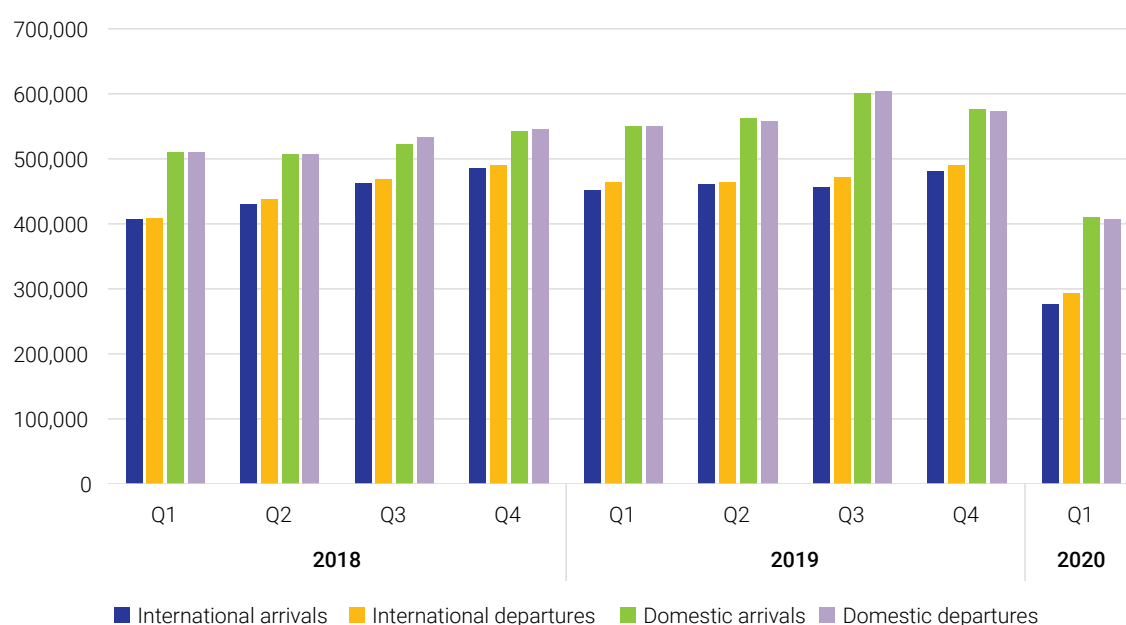
Source: Ministry of Transport and Malaysia Airport Holdings Berhad (MAHB).

Arrivals and departures

Penang International Airport (PIA) represents one of the main entry points to Penang, with tens of thousands of travellers moving within the airport on any given day[28]. The airport generally saw a growth in passenger arrivals and departures in 2019, with the exception of international arrivals for the third and fourth quarters (Figure 3.22). Domestic arrivals and departures were at their highest in Q3 2019, while the

numbers were highest for international travellers in the fourth quarter of the same year.

However, the situation has changed dramatically. With the COVID-19 pandemic taking root in early 2020, governments around the world have discouraged travel. Q1 2020 saw a significant decrease across the board for both domestic and international travellers.

[28] It must be clarified, however, that not all arrivals constitute of tourists, as some may be travelling for business and other purposes.

Table 3.15 Passenger growth at Penang International Airport by quarter, 2019

Passengers	% change			
	Q1	Q2	Q3	Q4
International arrivals	11.0%	7.1%	-1.2%	-1.0%
International departures	13.5%	6.2%	0.4%	0.1%
Domestic arrivals	7.8%	11.0%	15.2%	6.3%
Domestic departures	7.8%	10.0%	13.3%	5.0%
Total	**9.8%**	**8.7%**	**7.4%**	**2.7%**

Source: Penang Institute estimates based on data from Ministry of Transport and Malaysia Airport Holdings Berhad (MAHB).

Domestic arrivals and departures experienced higher growth rates compared with their international counterparts, with Q1 2019 being the only exception (Table 3.15). For Q1 2019, the growth for international arrivals and departures was 11.0% and 13.5% compared with their domestic equivalents, which recorded 7.8% growth for both categories. Domestic arrivals in the third quarter, with an increase of 15.2% in passengers, recorded the highest categorical growth. Q1 2019 recorded the highest growth in overall passenger movement (9.8%).

However, as observed in Figure 3.22, because of the gradual and global spread of COVID-19, passenger growth significantly decreased in the first quarter of 2020. With international arrivals and departures down by 38.8% and 36.9%, respectively, international passengers saw an overall decrease of 37.8%. Domestic travellers saw a 25.4% decrease for arrivals and a 26.1% decrease for departures, resulting in an overall decline of 25.7%. In April 2020, there were only 35 international departures and zero arrivals, while domestic travellers saw a drop of 98.3% from the preceding month.

Table 3.16 Total international arrivals and departures in Penang by country, 2018−19

Country	2018		2019		% change	
	Arrivals	Departures	Arrivals	Departures	Arrivals	Departures
Indonesia	548,525	540,199	585,418	585,462	6.7%	8.4%
Thailand	187,253	196,652	187,416	196,857	0.1%	0.1%
Vietnam	56,694	57,203	60,299	62,923	6.4%	10.0%
Singapore	675,780	702,085	693,775	732,519	2.7%	4.3%
China	76,819	75,087	80,638	77,236	5.0%	2.9%
Hong Kong	170,431	166,968	164,630	157,165	-3.4%	-5.9%
Taiwan	46,517	45,049	47,899	47,237	3.0%	4.9%
Qatar	23,936	22,734	30,740	31,417	28.4%	38.2%
Total	**1,785,955**	**1,805,977**	**1,850,815**	**1,890,816**	**3.6%**	**4.7%**

Note: "Country" refers to the exit and entry point of airports, not the country of nationality.
Source: Penang Institute estimates based on data from Malaysia Airport Holdings Berhad (MAHB).

There were eight countries with direct flight connections to Penang. However, travellers from the eight countries do not represent the entirety of Penang's international visitors, as a significant proportion of travellers from other countries would have arrived in Penang via Kuala Lumpur International Airport.

Table 3.16 shows that the highest number of direct international travellers to Penang originated from Singapore, standing for 38.4% and 38.1% of total passengers in 2018 and 2019, respectively. Indonesian travellers were a close second at 30.3% for 2018 and 31.3% in 2019. Nonetheless, Indonesia's passenger growth was higher than Singapore's,

with a 6.7% growth in arrivals and an 8.4% growth in departures against Singapore's 5.0% and 2.9% growth, respectively.

Despite having the lowest volume of passengers, Qatar recorded the highest growth rates of 28.4% in arrivals and 38.2% in departures. This is attributed to Qatar Airways entering its second year of providing direct flights to Penang, in addition to an extra flight weekly from July 2018 and a supplementary Friday flight providing connection to Langkawi from October 2019.

Data on travellers by country for the first half of 2020 have not been made available at the time of writing.

Table 3.17 Total domestic arrivals and departures in Penang by state and city, 2018−19

State/City	2018		2019		% change	
	Arrivals	**Departures**	**Arrivals**	**Departures**	**Arrivals**	**Departures**
Johor	263,803	257,160	326,887	312,487	23.9%	21.5%
Kelantan	24,113	26,675	27,287	29,582	13.2%	10.9%
Pahang	N/A	N/A	5,959	5,872	N/A	N/A
Kuala Lumpur	1,167,702	1,173,781	1,200,698	1,203,464	2.8%	2.5%
Subang	270,904	275,827	308,327	312,261	13.8%	13.2%
Sabah	96,071	101,295	111,403	109,650	16.0%	8.2%
Sarawak	86,067	84,844	101,176	99,694	17.6%	17.5%
Malacca	11,990	11,961	40,751	40,505	239.9%	238.6%
Langkawi	162,417	164,921	169,690	171,335	4.5%	3.9%
Total	**2,083,067**	**2,096,464**	**2,292,178**	**2,284,850**	**10.0%**	**9.0%**

Source: Penang Institute estimates based on data from Malaysia Airport Holdings Berhad (MAHB).

The highest number of domestic arrivals and departures originated from Kuala Lumpur, where visitors accounted for 56.0% of total passengers in 2018 and 52.5% in 2019. However, Table 3.17 shows that Kuala Lumpur recorded the lowest growth in passenger movement, with only 2.8% growth in arrivals and 2.5% growth in departures. Subang passengers were the second-highest in 2018, while this spot was taken by Johor travellers in 2019. Even so, Johor sustained higher growth rates in 2019. Malacca had the lowest volume of passengers

but recorded staggering growth rates of 239.9% in arrivals and 238.6% in departures.

Data on travellers by country and state for the first half of 2020 have not been made available at the time of writing. However, as seen in Figure 3.22, it can be concluded that travellers would be on the downward trend for the first two quarters of 2020. Travelers are expected to increase in phases when lockdown restrictions are lifted, but the volume of passengers are not anticipated to return to the level of previous years in the short term.

Hotels and accommodation

In 2018, there was a total of 192 hotels in Penang, although more than half were unrated. These unrated hotels are surmised to be small boutique and budget hotels that perhaps did not qualify for the star and Orchid system (a separate rating system for budget hotels). There were 12 five-star hotels in Penang, including Eastern and Oriental Hotel and Rasa Sayang Resort. Four-star hotels accounted for 10.4% with 20 hotels. These hotels also held the highest proportion of total rooms at 27.6%.

Homestays are another option of accommodation for tourists, especially international tourists. Tourism Malaysia, as part of the Ministry of Tourism, Arts and Culture, runs a Homestay Experience Programme (Program Pengalaman Homestay), where registered homestays are expected to provide opportunities for guests to immerse themselves in the daily lives of the community and understanding the local culture. The hosts play a major role in helping the guests to understand the way of life in the local community.

Table 3.18 Number and percentage of hotels and rooms by rating, Penang, 2018

Rating	Number of hotels	Percentage share of hotels	Number of rooms	Percentage share of rooms
5-star	12	6.3%	3,614	18.5%
4-star	20	10.4%	5,402	27.6%
3-star	14	7.3%	2,340	12.0%
2-star	13	6.8%	1,773	9.1%
1-star	3	1.6%	136	0.7%
3-Orchid	10	5.2%	799	4.1%
2-Orchid	9	4.7%	318	1.6%
1-Orchid	11	5.7%	254	1.3%
Unrated	100	52.1%	4,945	25.3%
Total	192	100%	19,581	100%

Source: Penang Institute estimates based on data from National Property Information Centre (NAPIC).

Table 3.19 Number of homestays, operators and rooms by district, Penang, 2019

District	Number of homestays	Number of operators	Number of Rooms
Timur Laut	0	0	0
Barat Daya	3	56	57
Seberang Perai Utara	2	25	32
Seberang Perai Tengah	3	46	65
Seberang Perai Selatan	3	107	110
Total	**11**	**234**	**264**

*Source: Ministry of Tourism, Arts and Culture Malaysia.*

As of 2019, the programme has registered 11 homestays in Penang, with Barat Daya, Seberang Perai Tengah, and Seberang Perai Selatan equally sharing the highest number of homestays with three establishments each (Table 3.19). Seberang Perai Selatan held the most operators and rooms—more than 50% greater in comparison with other districts with the same number of homestays.

According to statistics provided by the programme, domestic homestay tourists in Penang has been declining since 2016, reaching a five-year low of 3,663 guests in 2018. International homestay tourists, however, saw increases from 2014 to 2017, before dropping by 30.5% to 849 guests in 2018. Penang does not host a large number of homestay tourists; these are found in Pahang, Sabah, and Selangor.

However, the homestay statistics presented do not capture the number homestays that are not registered with the programme. Additionally, the statistics also excluded tourists staying in AirBnB, a choice of homestay-styled accommodation that has been increasingly popular among tourists and travellers.

Figure 3.23 Total number of hotel guests by type, Penang, 2015−19
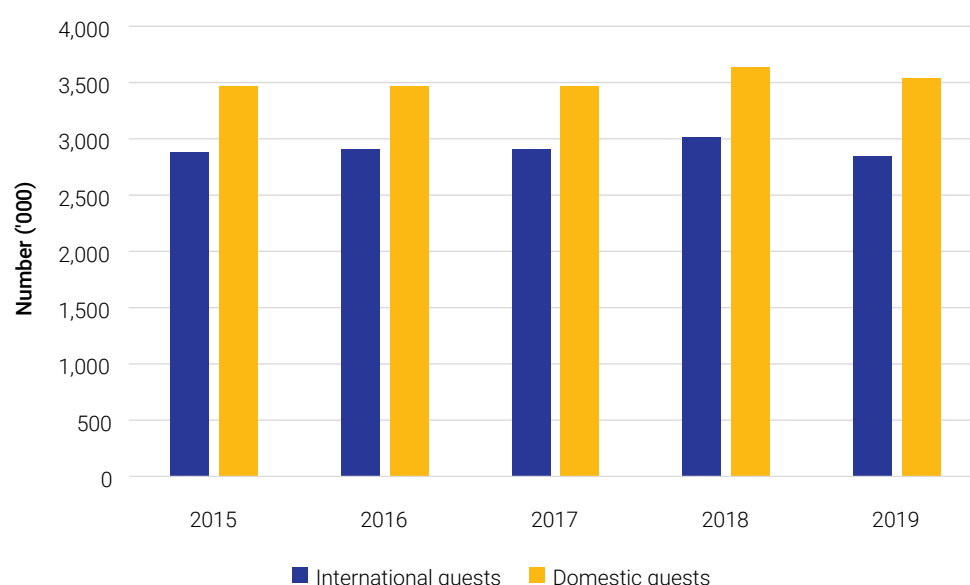
Source: Tourism Malaysia.

Figure 3.23 illustrates that the number of guests increased during 2015−18, although growth was considerably minute for domestic guests in 2016 and for international guests in 2017. However, a decrease was seen in 2019, where the number of international guests dropped by 5.6% while domestic guests declined by 2.7%. Overall, domestic guests in hotels outweighed those of international guests, typically by approximately 20%. The largest number of guests in the five-year period, both domestically and internationally, was observed in 2018, where the growth rate for the former was 4.9%, whilst the latter saw 3.6% growth.

Figure 3.24 Average hotel occupancy rate by type of hotel, Penang, 2018–Q3 2019
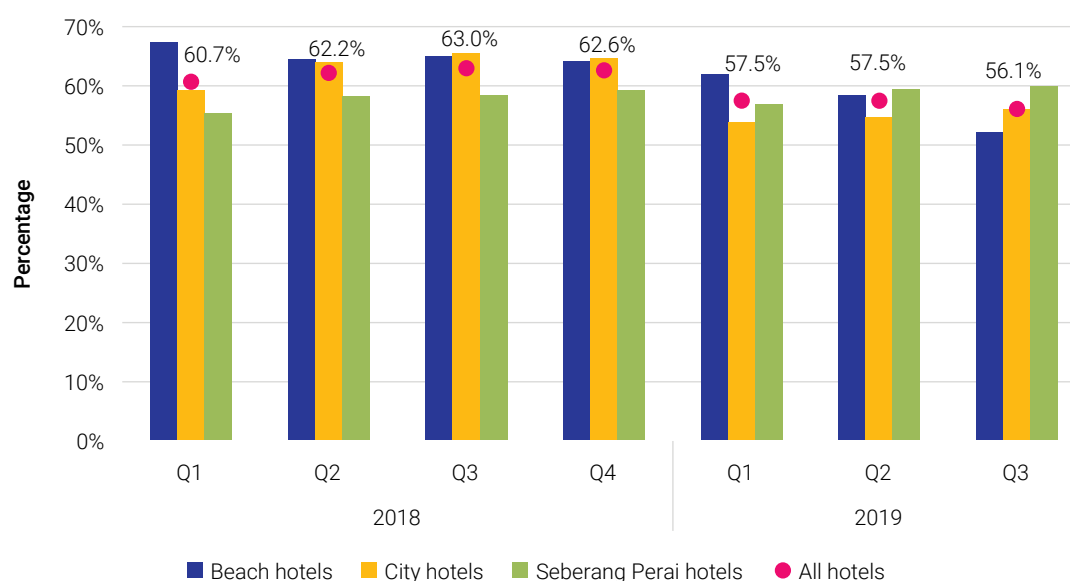
Source: Malaysian Association of Hotels, Penang Chapter.

Hotel occupancy rates for 2019 were declining across three quarters in 2019 (Figure 3.24). Both beach and city hotels, as well as all hotels as a group, comparatively recorded lower occupancy rates, with the exception of Seberang Perai hotels. The highest overall discrepancy was seen in Q3 2019, where the total occupancy rate fell by 6.9%.

Considering the occupancy rates for beach hotels, the rate fluctuated negligibly across quarters for 2018, but steadily declined quarter to quarter in 2019 (from 61.9% in the first quarter to 52.2% in the third), with the biggest drop of 12.8% observed in the third quarter. The highest occupancy rate for beach hotels in 2018 was the first quarter (67.4%), while the rate in Q1 2019 was 61.9%. To further illustrate the less-than-stellar occupancy rates in the last year, the lowest occupancy rate for 2018 (64% in the fourth quarter) was higher than the highest occupancy rate in 2019 (61.9% in the first quarter).

As with beach hotels, city hotels' average occupancy rate also varied across quarters in 2018, increasing from the first quarter before declining in the fourth quarter; this trend continued in Q1 2019. In contrast, an upward trend was observed for 2019. However,

the average occupancy rates were markedly lower than 2018: the highest occupancy rate for 2019 (56.1% in the third quarter) was, again, lower than the lowest for 2018 (59.3% in the fourth quarter).

Apart from city hotels, Seberang Perai hotels also saw higher average occupancy rates across all three quarters in 2019, outperforming its peers. The hotels recorded occupancy growth of between 1.2% and 1.5%, with the highest growth observed in Q3 2019.

Lower hotel occupancy rates have been attributed to more prudent spending by tourists (Teoh, 2019). With hotel room rates being markedly more expensive compared with budget hotels, homestays, and AirBnB, tourists are increasingly turning to the latter as their preferred accommodation choice.

Although no official numbers have been released thus far for 2020, it can be deduced that Penang's hotel occupancy rate will see astronomical declines owing to the COVID-19 pandemic. A small sample of hotels surveyed by Penang Institute disclosed that they had zero guests and bookings for the month of April (Box 3.4). This situation will persist until the tourism sector eventually recovers.

Travel agencies and tourist guides

Even though travel and planning are becoming increasingly convenient with the digitalization of flight bookings, accommodation, and tours, travel agencies still maintained its market share, as there are still tourists who prefer to avoid the extensive planning that can be required. In 2019, there were 380 registered travel agencies in Penang, with 53.7% of them responsible for inbound, outbound, and ticketing services (Figure 3.25). There was no one company that exclusively provided outbound services, as outbound services are often coupled with another service. However, there were 86 (or 22.6%) travel agencies that exclusively handle inbound tourists and tours.

Figure 3.25 Total number of registered travel agencies in Penang by type, 2019
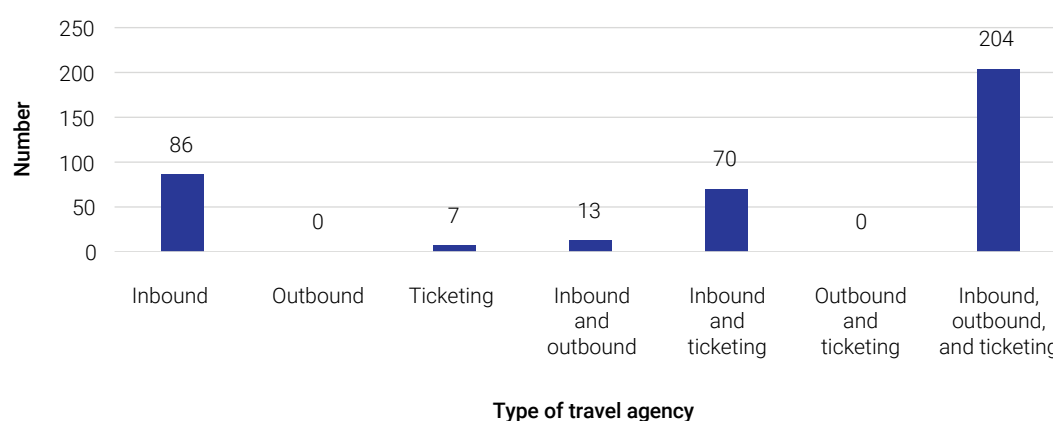
Source: Tourism Malaysia.

Figure 3.26 Total number and percentage of registered tour guides by gender and type, Penang, 2019
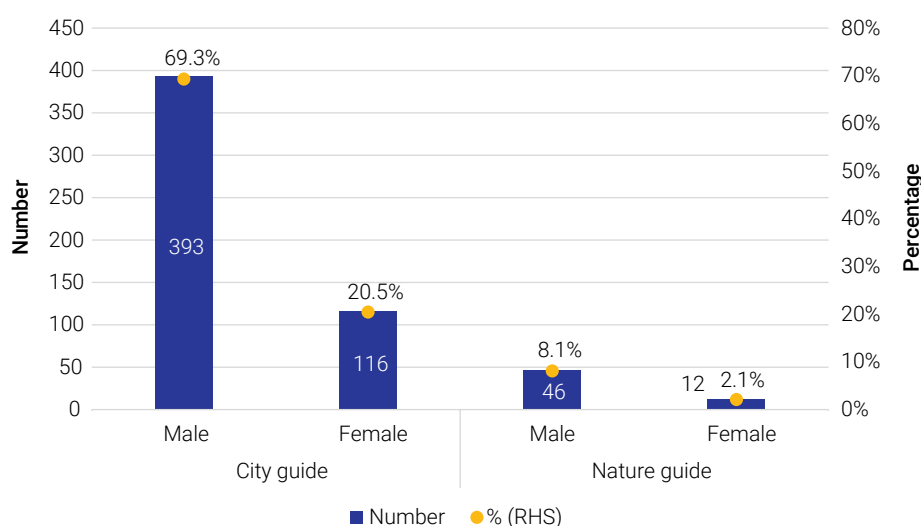
Source: Penang Institute estimates based on data from Tourism Malaysia.

As shown in Figure 3.26, Penang provided 567 registered tourists guides: 89.8% were city guides and the remaining 10.2% were nature guides. The industry is dominated by males, as the proportion of male tourist guides is significantly higher than that of female guides.

For instance, male city guides in 2019 outnumbered female city guides by 48.8%, and female nature guides were only about a quarter of male nature guides. This may be because the work of a tourist guide required long hours as well as late and early transfers at the

airport. Some women may struggle at balancing these unusual hours with their additional domestic duties.

However, with the COVID-19 pandemic, both travel agencies and tour guides have been significantly affected. The global lockdowns imposed have resulted in no demand for the services of tour agencies and

guides. Both the state and federal government have provided stimulus packages to players in the tourism industry in a bid to help them cope with the loss of business and income, but the negative impact is expected to persist as short-term recovery is looking to be unlikely. The overall recovery will be dependent on global control of the pandemic.

Tourists in Penang

Between 2018 and 2019, owing to a weakening ringgit and external and domestic economic challenges due to rising and deepening global trade tensions—particularly between the United States and China—along with policy changes brought about by a new governmental regime, Malaysians are increasingly opting to replace international travel with domestic travel. As seen in Table 3.20, Penang recorded 3.9 million domestic tourists in 2019[29]. However, this was a decline of 2.5% over the previous year. This can be attributed to the significant reduction of travellers from Johor and Negeri Sembilan, which had recorded a large number of tourist arrivals in 2018 but saw declines of -31.7% and -68.9%, respectively,

in 2019. Interestingly, local tourists within the home state declined significantly by 88.4% in 2019, contributing to the decline in domestic tourists during the year. The general election held in 2018 may be the reason for the large number of Penangites being recorded as tourists due to the crossing of districts. A significant decline was also observed for Sabah and Labuan, but from a lower base.

The largest growth was seen in Kedah (154.1%) and Kuala Lumpur (90.9%), which also contributed the third- and four-highest number of overall tourists and visitors, respectively. Penang received the most tourists from Selangor, where a 50.6% increase was seen.

Table 3.20 Number and percentage of domestic tourists by state, Penang, 2018−19

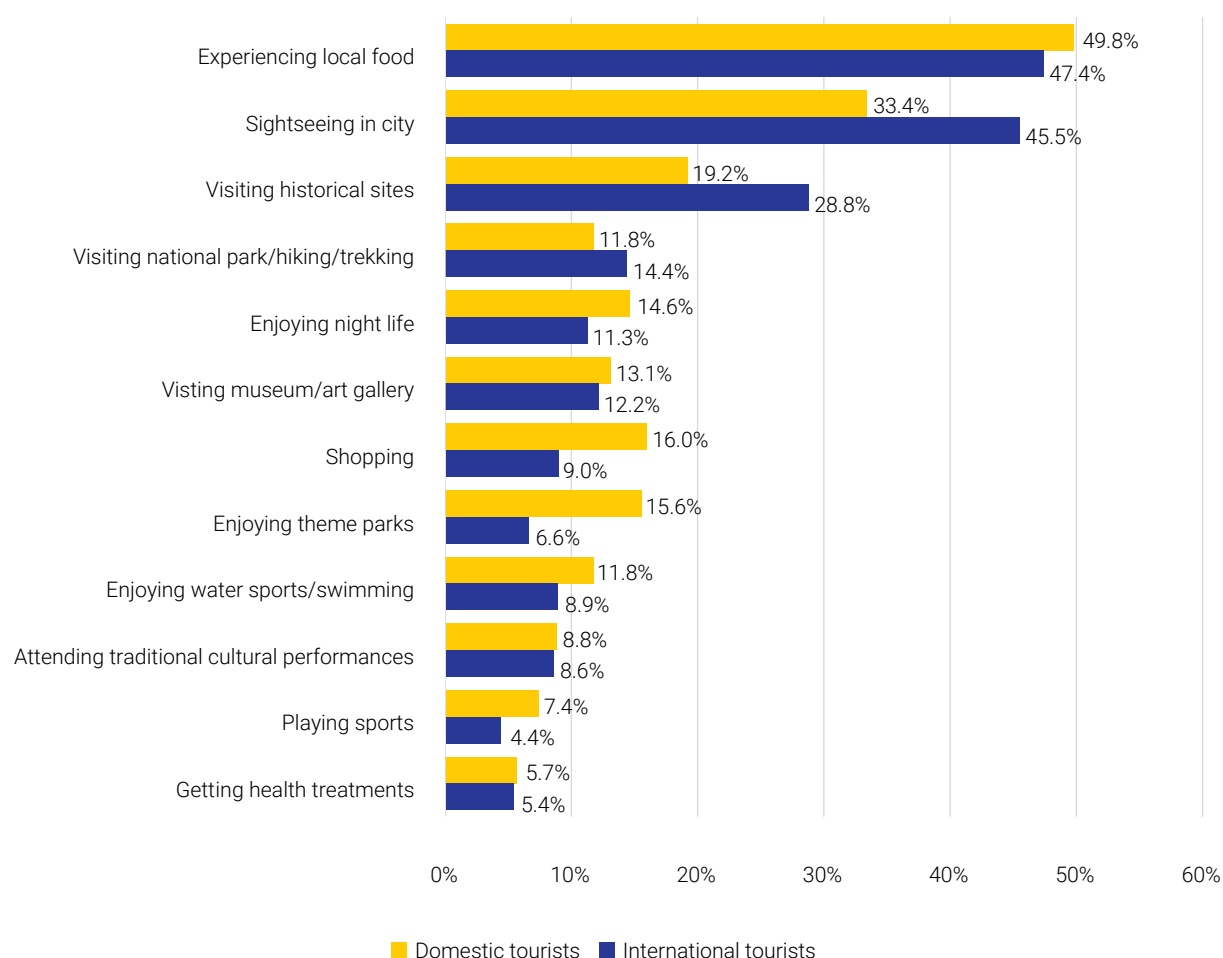| State	2018		2019		% change
	Number ('000)	%	Number ('000)	%	
Johor	85.4	2.1%	58.3	1.5%	-31.7%
Kedah	262.9	6.6%	668.1	17.1%	154.1%
Kelantan	207.6	5.2%	175.3	4.5%	-15.6%
Malacca	39.5	1.0%	53.8	1.4%	36.2%
Negeri Sembilan	140.8	3.5%	43.8	1.1%	-68.9%
Pahang	76.3	1.9%	70.8	1.8%	-7.2%
Penang	**1,021.7**	**25.5%**	**118.5**	**3.0%**	**-88.4%**
Perak	837.4	20.9%	715.2	18.3%	-14.6%
Perlis	59.8	1.5%	104.8	2.7%	75.3%
Selangor	1,001.3	25.0%	1,507.6	38.6%	50.6%
Terengganu	30.1	0.8%	26.8	0.7%	-10.9%
Sabah	40.7	1.0%	14.1	0.4%	-65.3%
Sarawak	14.0	0.3%	6.9	0.2%	-51.0%
*W.P. Kuala Lumpur	169.1	4.2%	322.8	8.3%	90.9%
*W.P. Labuan	7.7	0.2%	1.5	0.0%	-80.9%
*W.P. Putrajaya	8.7	0.2%	16.2	0.4%	86.9%
Total	**4,002.9**	**100%**	**3,904.6**	**100%**	**-2.5%**

*denotes federal territories
Note: The number of international tourists by nationality is not available.
Source: Penang Institute estimates based on data from Domestic Tourist Survey, Department of Statistics, Malaysia.

[29] As defined by the Domestic Tourist Survey, an individual is considered a domestic tourist once they leave their usual place of residence and remained at another location for more than 24 hours. For Penang, the crossing of districts is included in the definition of domestic tourist. For example, an individual who lives in Timur Laut but spent more than 24 hours in Seberang Perai Utara would be considered a tourist.

**Figure 3.27 Activities partook by selected international and domestic tourists in Penang, 2018**

Activity	Domestic	International
Experiencing local food	49.8%	47.4%
Sightseeing in city	33.4%	45.5%
Visiting historical sites	19.2%	28.8%
Visiting national park/hiking/trekking	11.8%	14.4%
Enjoying night life	14.6%	11.3%
Visting museum/art gallery	13.1%	12.2%
Shopping	16.0%	9.0%
Enjoying theme parks	15.6%	6.6%
Enjoying water sports/swimming	11.8%	8.9%
Attending traditional cultural performances	8.8%	8.6%
Playing sports	7.4%	4.4%
Getting health treatments	5.7%	5.4%

■ Domestic tourists ■ International tourists

Note: The survey consisted of responses from 3,100 tourists (1,619 international tourists and 1,481 domestic tourists) aged 18 and above and had spent a minimum of one night in Penang from January to December 2018.
Source: Penang Tourist Survey, 2018.

According to a survey conducted by Penang Global Tourism, experiencing and enjoying local food was cited as the top activity for both international (47.4%) and domestic tourists (49.8%) in 2018 (Figure 6), with most respondents classifying it as an essential activity. Activities within George Town, such as city sightseeing and visiting historical and heritage sites, were also highly popular, with international tourists taking a greater interest in said activities. On the other hand, activities such as shopping and enjoying theme parks were more popular among domestic tourists, with 31.6% of surveyed domestic tourists taking part in these activities compared with 15.6% of international tourists.

The same survey also shows that the spending patterns of international and domestic tourists did not differ significantly, with the latter spending more than the former across all categories except for local transportation (Figure 3.28). This was because most domestic tourists would have opted to drive from their home states (this is reflected in Figure 3.29), while international visitors would have to spend on taxis and ride-shares.

Figure 3.28 Proportion of expenditure by selected international tourists, Penang, 2018
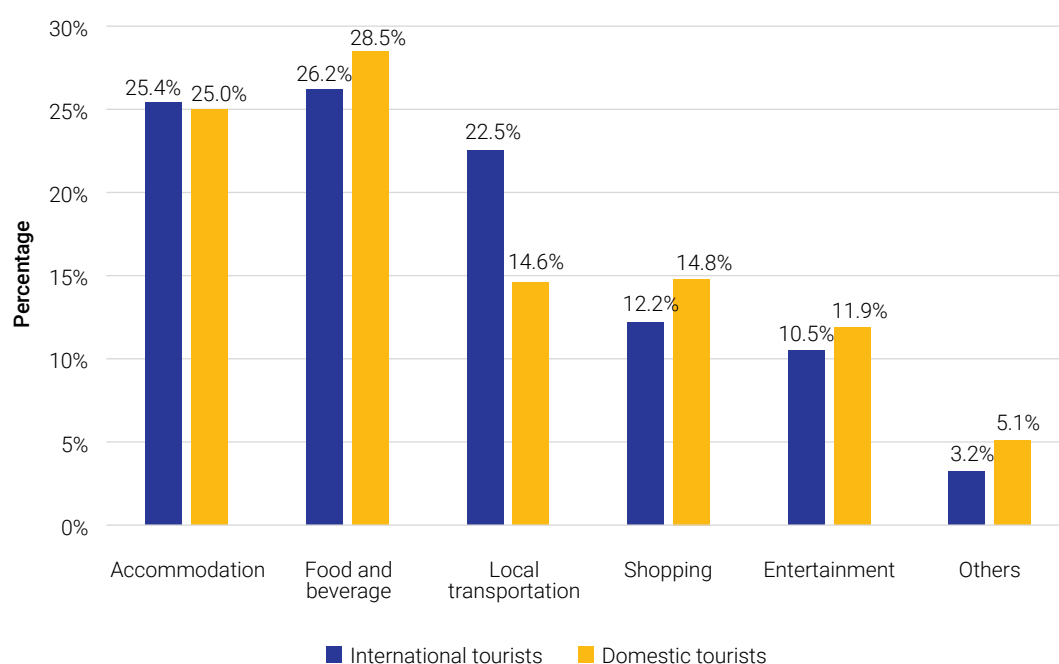
Note: The survey consisted of responses from 3,100 tourists (1,619 international tourists and 1,481 domestic tourists) aged 18 and above and had spent a minimum of one night in Penang, from January to December 2018.
Source: Penang Tourist Survey, 2018.

Both international and domestic tourists spent the most on food and beverage (with domestic spending being higher), which was approximately 27.4% of overall tourist expenditure. This was followed by accommodation (25.2%), shopping (19.6%), and entertainment (11.2%).

Figure 3.29 Total expenditure by domestic tourists by component, Penang, 2017–18
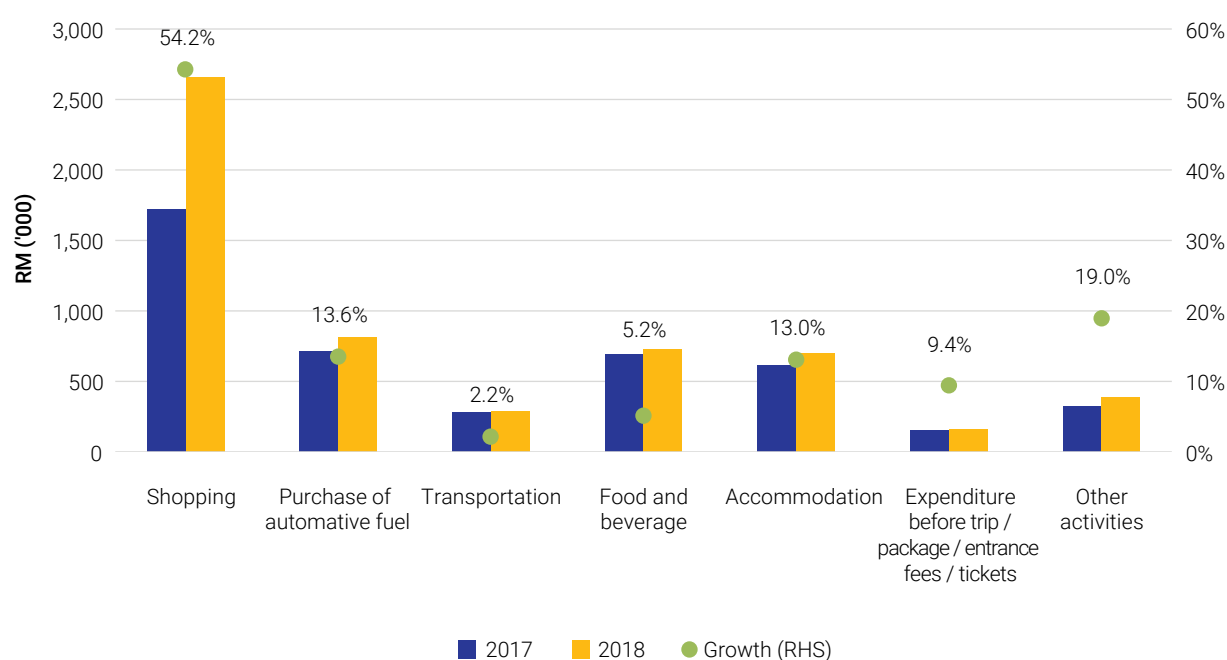
Note: Domestic tourist expenditure by state for 2019 has not been made available.
Source: Penang Institute estimates based on data from Domestic Tourist Survey 2020, Department of Statistics, Malaysia.

The Domestic Tourist Survey provided a more comprehensive and in-depth picture of domestic spending, where the proportions differed from the previous survey. According to Figure 3.29, the highest proportion of spending went towards shopping for both 2017 and 2018, with a high growth rate of 54.2% in 2018. The survey showed that more than 90% of domestic visitors arrived via personal vehicles. This would explain the proportionally higher spending on automotive fuels, which saw a 13.6% growth in 2018. Domestic tourists also spent more on food and beverage in comparison with accommodation, as some would be staying at the properties of friends and family. Nonetheless, growth in accommodation spending (13.0%) was higher than food and beverage (5.2%).

The number of both international and domestic tourists are expected to significantly decline in 2020 as a result of the COVID-19 pandemic. Due to travel restrictions imposed by all countries, the domestic tourism industry has stagnated completely between March and May 2020. At the time of writing, restrictions for domestic travel have recently been lifted, but international travel is still highly restricted, with non-Malaysians not allowed to enter the country until further notice. The Penang state government has formulated plans to focus on promoting domestic tourism with the reopening of state borders in June 2020. A recovery in international tourism is not expected in the coming months.

Heritage tourism

Heritage tourism, as defined by the World Tourism Organisation, is a form of tourism where travellers are able to experience a country's culture and heritage, be it through the physical structures such as buildings and architecture, or through experiences such as festivals and other cultural events. With the United Nations Educational, Scientific and Cultural Organization (UNESCO) inaugurating George Town as a World Heritage City in 2008, George Town has become the centre of Penang's heritage tourism.

Penang's rich history and mix of cultures has ensured that heritage conservation remains a priority of the people as well as the government. Penang Heritage Trust (PHT) (a non-governmental organization) and George Town World Heritage Incorporated (GTWHI) (a government-linked company) are the two bodies that aim to preserve the heritage of Penang. Both

organisations are integral when it comes to providing support to the local government and communities in protecting George Town's heritage. GTWHI in particular has been documenting the intangible heritage and traditional trades of the community, such as clogs-making, joss-stick making, and wayang potehi (traditional glove puppetry).

International tourists are especially attracted to the cultural elements of George Town's heritage. The heritage trail walks conducted by Penang Heritage Trust are very popular among these tourists, as experienced guides are able to provide the historical and cultural background behind sites such as Fort Cornwallis, the Street of Harmony, the Clan Jetties, and others. The 2018 Penang Tourist Survey showed that visiting historical sites was the third-most-popular activity for both international and domestic tourists.

Heritage tourism also has the potential to thrive outside George Town. There has been calls by PHT to inscribe Pulau Jerejak as a UNESCO World Heritage Site (alongside Sungai Buloh Leprosarium) (Mok, 2019). With a history dating back to before World War II, Pulau Jerejak was known as the "Alcatraz of Malaysia". The island helmed a maximum-security prison but also functioned as a leper colony, and had housed a tuberculosis centre (The Star, 2020). Other sites of historical significance within the island includes a mixed-faith cemetery and a pre-war underground bunker. There is significant potential for Pulau Jerejak to be preserved and promoted as a heritage site for tourism.

The popularity of heritage tourism has brought on the establishment of new and local businesses, which in turn would generate positive effects for the state's employment opportunities and encourage economic growth. The service industry in George Town, particularly the hotel and food and beverage segments, has grown significantly over the years. Existing local businesses also stand to reap positive economic effects from tourism spending.

But there are also unwanted effects resulting from the boom in heritage tourism. The rapid addition of cafes, souvenir shops, and boutique hotels has resulted in the gentrification of George Town. Many of the original occupants have moved out, selling their properties to developers and contributing to the

decline of traditional communities and trades. The smaller roads within the heritage enclave are also becoming increasingly congested.

The COVID-19 pandemic has resulted in heritage tourism coming into a standstill for a large part of 2020. The pandemic may also have changed the landscape of heritage tourism. The emphasis of small groups and social distancing may be something that will persist even in a post-COVID-19 world. With new measures in place, the congestion of people and cars in the heritage area can be improved. A more sustainable way of conducting heritage tourism can be realised.

It is vital that the state government and all stakeholders work together to strike a proper balance between tourism growth and heritage conservation. Tourism revenue should be channelled back into the local communities to help them preserve their way life, and in turn preserve the cultural charm and heritage of George Town.

Ecotourism

In a time where sustainability is seen as crucial, the International Ecotourism Society encourages ecotourism as a form of "responsible travelling", for this sector of tourism places importance on the natural environment. The main objective of ecotourism is to introduce an appreciation of nature in its purest form as a tourist activity. Eco-tourists would be able to enjoy various kinds of flora and fauna in their natural habitat, and educate themselves on the importance of environmental conservation and sustainability. One of the main features of ecotourism is that it prioritises minimal impact on the environment and its surroundings, and therefore operates on a much smaller scale. Ecotourism also advocates for earned revenue to be put towards ecological conservation and sustainability of local indigenous cultures.

Hiking, trekking, and visiting national parks was ranked third on the 2018 Penang Tourist Survey. Penang boasts of having rainforests that are hundreds of years old, and these rainforests are carefully maintained and preserved according to sustainable forest principles, as they are gazetted as Permanent Reserved Forests (PRFs). Peat and mangrove swamps are also classified and protected as PRFs, ensuring that ecotourism activities would not negatively affect the natural environment.

The Penang National Park (also a PRF), Penang Hill, and Botanical Gardens are among the other nature spots sought out by eco-tourists. Pantai Keracut, found within the confines of the Penang National Park, is gaining traction for its meromictic lake and as a hotspot for turtle nesting. Monkey Beach has been touted by The Travel as one of the 20 best beaches in the world (Henley, 2019), where a colony of macaques roam free in their natural habitat. Built attractions such as Entopia and the Habitat centre their respective developments around the preservation of nature, with attention given to ecological sustainability.

The state government has also prioritised the development of ecotourism on Seberang Perai's beaches, forests, and mangrove swamps, with the intention of turning Seberang Perai into the main destination for ecotourism. Teluk Air Tawar-Kuala Muda is one of the main attractions, with the mangrove being a key destination for bird-watchers as it is home to more than 200 species of shorebirds and waders. The coast is regarded as one of Peninsular Malaysia's most important bird habitats (Heng, 2013).

The mangrove stretches between Teluk Air Tawar and Kuala Muda and other similar mangrove forests needs to be protected as they are important sources of income for local fishermen, being that they do function as breeding ground for several species of commercial fish. The vivacity of the mangroves and the authenticity of the fishing and local communities make them attractive destinations for ecotourism.

As with other sub-sectors of tourism, the success of ecotourism has given birth to more economic activities in the vein of tours, homestays, food and beverage services, and others. This in turn would provide employment opportunities for the local communities, for example as nature guides. However, ecotourism rules state that the economic benefits must not take priority over the preservation of nature. Sustainability is the key to ecotourism, and any negative impact on the environment in the name of development would not be feasible during efforts to expand the sub-sector. The maintenance of the natural environment should always take precedence.

Ecotourism has not been exempted from the adverse effects of the pandemic. However, the chances of recovery in ecotourism may be higher than other sub-sectors as ecotourism places a strong focus on small groups for the purpose of nature preservation and sustainability.

Cruise tourism

Cruise tourism is one of the largest sub-sectors of tourism. Cruise tourism offers accommodation, food and beverage, recreational activities, sports facilities, and retail services, all in one place. Cruise ships often make several calls in different cities, where passengers can disembark and explore.

Swettenham Pier is one of the 10 ports in Malaysia that acts as a berth and dock for cruise ships. Its cruise terminal sees high volumes of cruise ships and passengers every year, and is one of the country's busiest ports. According to the state government, there was an increase of 27.1% in cruise passengers and a 7.0% increase in cruise ship arrivals in 2019 from the previous year, with five ships making it their maiden call (Trisha, 2020). The largest increase in passengers came from South Korea (75.8%), followed by the United Kingdom (68.1%) and India (51.6%). China and Australia also registered large increases of passengers at 50.8% and 44.9%, respectively.

Swettenham Pier Cruise Terminal is slated to undergo a significant upgrade in 2020, with the project scheduled for completion within two to three years (Ong, 2020). There will be an extension of 220 metres to the north of the existing wharf, which will enable two of the world's largest Oasis-class ships to dock simultaneously. Upon completion, the pier will be able to increase its passenger capacity by 50% as it will be able to accommodate 12,000 passengers in comparison with the present 8,000 passengers.

Swettenham Pier's strategic location allows cruise passengers to enjoy George Town, as it is within walking distance to popular heritage sites such as the Clan Jetties. Other tourist areas such as Armenian Street and the Street of Harmony are also within reach, either by walking or by public transportation.

However, the development of cruise tourism has adverse effects on environmental sustainability. The waste generated by cruise liners often pollute coastal areas, damaging the marine ecosystem (Brida & Aguirre, 2009); cruise ships need to undertake more environmental friendly measures in disposing their waste. Local communities around the pier may also face over-commercialisation, negatively impacting local traditions.

Cruise tourism is arguably the sub-sector that has been impacted the most by the pandemic. Given the nature of cruises, where crowding in semi-enclosed areas is unavoidable and exposure to new environments with numerous cruise stops is frequent, the spread of the pandemic among cruise passengers had been rapid—and deadly. This is especially evident in the case of the Diamond Princess and the Ruby Princess. While the cases on the two aforementioned ships are the most serious, they are by no means the only cruise ships affected.

Sailing without a full load of passengers amid social distancing measures has been deemed untenable by industry leaders, who say that this will severely affect their financial performance (Hancock, 2020). Additionally, tourists may be more unwilling to board cruise ships after the debacles of the Diamond Princess and the Ruby Princess. The Diamond Princess became a hotspot for COVID-19 when a disembarked passenger was found to be COVID-positive. The ship, with 3,711 people onboard consisting of both passengers and crew, was forced into quarantine for 27 days in the Port of Yokohama. The handling of the incident was deemed to be chaotic and inadequate, and quarantine measures onboard were severely lacking, leading to 712 infections and 14 deaths (BBC News, 2020).

On the other hand, the Ruby Princess, upon docking in Sydney, made the mistake of allowing its 2,700 passengers to disembark and return home via domestic flights without proper temperature checks and scans (Zhou, 2020). This was despite the ship recording incidences of 158 illnesses involving high temperatures on the previous journey. Approximately 900 passengers and members of the crew were tested positive for COVID-19, with infections scattered throughout Australia, in which it was estimated that one in 10 Australian COVID-19 cases was linked to the cruise ship (Cockburn, 2020).

The future of cruise tourism is looking to be extremely shaky; cruise companies will need to collaborate with governments to develop enhanced health and safety measures for passengers and crew, both onboard and when they dock.

Wedding tourism

Wedding tourism is a sub-sector that has gained much attention in the last two years. Wedding tourism refers to a form of tourism where travelling takes place for the purpose of marriage-related matters—be it engaging in a wedding ceremony (either as part of a bridal party or as relatives and friends) or the process of taking engagement and wedding photos (Lowry, 2017). With its rich and diverse mix of cultures, Penang has emerged as one of the top wedding destinations within the region.

PGT has been actively promoting Penang as a destination for engaged and soon-to-be married couples. George Town's fusion of eastern and colonial heritage, Batu Ferringhi's beaches, and natural environments of Penang National Park and Teluk Air Tawar provide a distinctive backdrop for wedding photos and wedding ceremonies.

Couples are also able to choose different styled weddings for their special occasion, with the Peranakan-style Baba and Nonya wedding being a popular option and the Pinang Peranakan Mansion serving as a complimenting venue. Malay, Chinese, and Indian wedding ceremonies can provide individually unique experiences for soon-to-be wedded couples.

The arrival of wedding guests in the form of friends and relatives to Penang also contribute a significant amount of revenue towards the tourism industry, as they are likely to spend on accommodation, food, transportation, and shopping, in addition to partaking in tourist activities.

The growth of wedding tourism has had positive effects on the wedding planning industry, encouraging the establishment of new businesses such as bridal houses, photography studios, and caterers. These ventures were anticipated to provide employment opportunities in addition to contributing towards the state's economic growth.

However, the industry has suffered significantly from the pandemic. The pandemic has placed limitations on wedding ceremonies and parties owing to the need for social distancing and the minimisation of crowds, leading to weddings increasingly getting cancelled or delayed. Furthermore, as long as Malaysia's borders remained closed or restricted, wedding tourists will be unable and disinclined to choose Penang as a destination, severely affecting the growth of wedding tourism. The recovery of this sub-sector will be dependent on the reopening of borders and the global ability to overcome the COVID-19 pandemic.

Education tourism

Education tourism is defined as a form of tourism where tourist activity and education takes place simultaneously, where travel is either motivated by the tourists' desire to seek education, be it academic or cultural ("education first"), or that the tourists aim to receive educational information on local cultures and traditions during their travels ("tourism first") (Lowry, 2017). In short, education tourism stipulates that the tourist must make education their primary or secondary purpose over the course of their trip.

As a spill-over effect to other sub-sectors of tourism, education tourism in Penang has been thriving. The steady growth of the sub-sector has resulted in the establishment of the Penang Centre of Education Tourism (PCET), which is tasked with promoting Penang internationally as a destination for education by highlighting the quality and variety of the state's institutions of learning.

Education tourism in Penang focuses primarily on tertiary education and technical skills, such as culinary skills. As seen in Table 3.21, most members of PCET comprises private higher-education institutes in Penang, such as Penang Medical College and Tunku Abdul Rahman University College. These colleges are highly reputable and offer twinning programmes to internationally renowned universities such as the Australian National University, the University of Essex, and Ohio State University.

Table 3.21 List of educational institutions under Penang Centre of Education Tourism, 2019

Full members	Associate members
Culinary Arts Centre	Clinical Hypnotherapy Practitioners Malaysia
Disted College	EDS Business Sdn. Bhd.
Equator College	First Penguin Sdn. Bhd.
Golden Chef Culinary Academy	Livingston House of Learning
Han Chiang College	Penexpo Events Sdn. Bhd.
INTI International College	
IPK College	
UOW Malaysia KDU Penang University College	
Olympia College	
Penang Medical College	
SEGI College	
Sentral College	
Stradford International College	
Tunku Abdul Rahman University College	

Source: Penang Centre of Education Tourism.

Indonesian students account for the most number of students taking part in education tourism in Penang, and the numbers are continually increasing each year. PCET has said that the large number of Indonesian students are spill-over effects from Penang's medical tourism. Penang's liveability has made lasting impressions on medical tourists, and some have opted to send their children to Penang for higher education, in addition to recommending Penang as an education destination to friends and family. Other international students come from within ASEAN (Myanmar, Thailand) and Asia (China, South Korea, and India).

PCET has also engaged with the Japan Travel Agent Association in hopes of attracting Japanese students to Penang. Penang welcomed a group of 20 Japanese students in August 2019, who were placed in homestays and attended short courses in colleges. The students were able learn and understand the local way of life with their hosts, in addition to receiving an academic experience at their colleges. PCET hopes to expand and grow the programme and to further tap into the Japanese market.

International students engaged in a wide variety of courses, with the more frequently chosen courses being business, marketing, accounting, and hospitality. Culinary arts are also popular. Some colleges are able to curate short courses for international students and student exchange, where tourist activities are embedded into the course itself. The students are then able to combine academic learning with cultural learning.

In addition to generating economic revenue, the growth of education tourism has encouraged private higher-education institutes to work towards improving the quality of education and expand the number of courses available to remain competitive in the domestic and regional markets.

The COVID-19 pandemic has negatively impacted the potential of Penang's education tourism. Even though travel restrictions have been lifted for international students (Puvaneswary, 2020), some international students may be unable to continue their education due to financial constraints. Private higher-education institutions in Penang are expected to see a drop in new intake of international students; the sub-sector's performance will only see improvements with the rebounding of the global economy.

Medical tourism

Malaysia is ranked high as a destination for health tourists due to the country's comparatively affordable yet high-quality medical services (The Star, 2019). Medical tourism in Malaysia is strictly regulated, monitored closely by the Ministry of Health and Ministry of Tourism, Culture and Arts. The Malaysia Healthcare Travel Council (MTHC) is the coordinating body for tourists and medical facilities at the national level. Most medical tourists to Malaysia have cited Penang as their preferred destination to receive medical treatment (Lim, 2019). As a result, medical tourism is one of the most important—and most profitable—sub-sectors in Penang's tourism industry.

Penang boasts a number of private hospitals staffed with reputable and experienced doctors, professional staff, and advanced medical equipment (Lim, 2019). Penang's equivalent to MHTC, Penang Centre of Medical Tourism (PMED), is responsible for the management and marketing of medical tourism for the state, and the organisation frequently participates in international healthcare tourism conferences to promote Penang as a destination of choice.

Currently, there are 11 full members and 11 associate members in PMED (Table 3.22). Most of the listed private hospitals are centred on the island and clustered in Timur Laut. The hospitals have also undergone extensive restructuring and expansion to accommodate the growing number of international and local patients.

**Table 3.22 List of medical institutions under Penang Centre of Medical Tourism, 2019**

Members	Associate members
Bagan Specialist Centre	Clinical Hypnotherapy Practitioners Malaysia
Genesis IVF & Women's Specialist Centre	Eco Terraces Care Hub
Gleneagles Penang	Heartbit E-ECP
Island Hospital	dr.Spine Chiropractic Centre
Georgetown Specialist Hospital	HAMC Health Solution Centre
KPJ Penang Specialist Hospital	Marina Dental
Loh Guan Lye Specialists Centre	MediAsia Advance Wound Care & Tissue Repair Centre
Mount Miriam Cancer Hospital	Spinecare Chiropractic
Optimax Eye Specialist Hospital	PS Healthcare Gentle Chiropractic & Spine Rehabilitation
Pantai Hospital Penang	TMC Fertility & Women's Specialist Centre (Penang)
Penang Adventist Hospital	TLC Orthopaedic Physiotherapy

Source: Penang Centre of Medical Tourism.

Medical tourism in Malaysia is a billion-ringgit industry and has significant multiplier effects on the national economy. According to MHTC, the number of healthcare travellers to Malaysia are continually increasing; in 2018 there was a 14.0% increase in healthcare travellers. As seen in Figure 3.30, Penang is the most popular destination, accounting for 56.8% of healthcare travellers entering the country. Malacca follows at 15.0%. Kuala Lumpur and Selangor only received 9.5% and 7.2%, respectively, of the country's healthcare travellers.

Figure 3.30 Percentage of healthcare travellers by preferred destination, Malaysia, 2018

Total healthcare travellers: 661,300 people
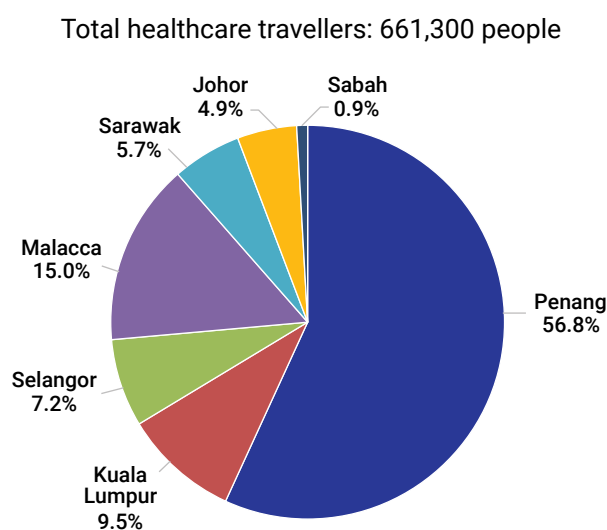
Source: Malaysia Healthcare Travel Council.

Penang contributed 60.7% of total revenue in 2018 (Figure 3.31). The next-best-performer was Kuala Lumpur with 9.9%, followed by Selangor at 9.5%.

Malacca, despite drawing more patients than the latter states, collected only 9.4% of total medical tourism revenue.

Figure 3.31 Percentage of revenue generated by healthcare travellers by state, Malaysia, 2018

Total revenue: RM 935 million
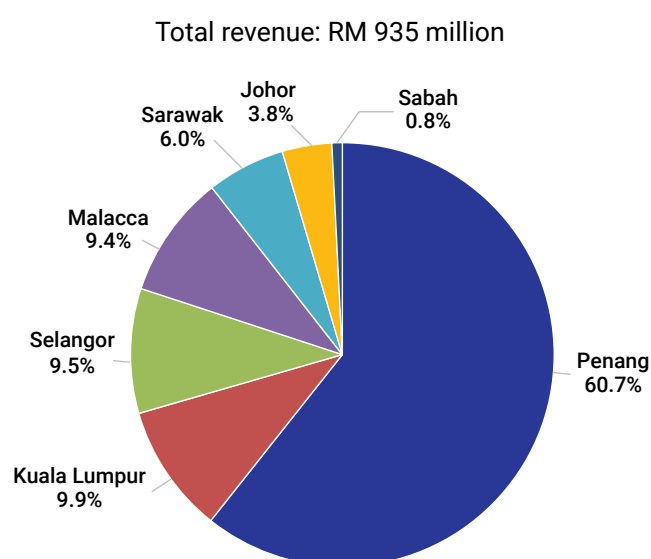
Source: Malaysia Healthcare Travel Council.

The growth of patients and revenue in Penang, however, has fluctuated during 2014–18 (Figure 3.32). The state experienced a significant drop in total number of patients and revenue (-16.0% and -6.9%, respectively) in 2015, before recording growth for 2016 and 2017. In fact, there was a significant growth of 20.1% in patient revenue in 2017, although growth for patients slowed from 15.0% in 2016 to 10.1% the following year. A decline was observed in 2018, with the number of patients dropping by 3.8% and total revenue decreasing by 0.5%. However, it must be noted that PMED only collected the information from certain hospitals, and actual numbers may differ.

Figure 3.32 Number and annual growth of healthcare travellers and revenue generated for medical tourism sector in Penang, 2014–18
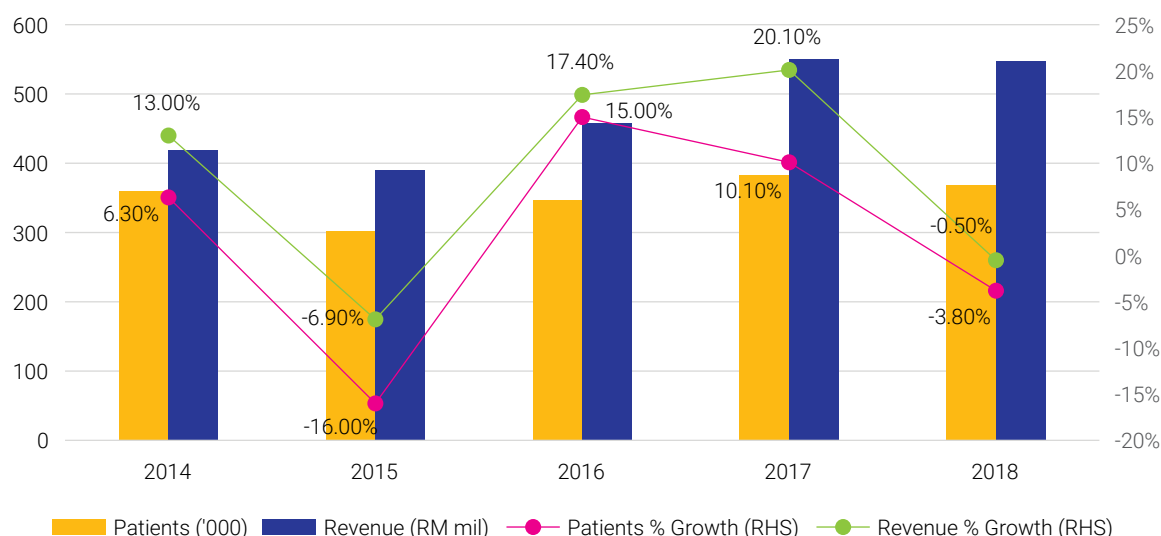
Note: The above figures are only provided by Loh Guan Lye, Pantai Hospital, Island Hospital, Mt Miriam, Adventist, Gleneagles, Bagan, and KPJ Penang Specialist Hospital, and may not be an accurate and comprehensive representation of total patients and revenue for Penang's medical tourism.
Source: Penang Institute estimates based on data from Penang Centre of Medical Tourism.

Indonesian patients accounted for more than 95% of Penang's medical tourists in 2018. With the availability of direct flights to Penang from Medan, Jakarta, Surabaya, and Banda Acheh, Penang is easily accessible to Indonesians medical tourists. The two countries are also culturally similar in some ways. Medan in particular shares many similarities with Penang; for instance, both peoples speak Hokkien.

PMED has stated that the more common procedures and medical treatments undertaken by patients are in the fields of oncology, cardiology, orthopaedics, and paediatrics. Aesthetic procedures are also becoming increasingly popular.

Penang's attractiveness as a medical tourism destination stems from the affordability of its private healthcare system. Additionally, Penang is also highly competitive when it comes to the quality of healthcare, and has a wide range of specialists and surgeons available. There are numerous hotels strategically located near hospitals. Furthermore, Penang is already well-known as a tourist destination, with George Town's inscription as a UNESCO World Heritage City, and has world-renowned local food.

PMED is actively working to diversify, and currently has a special focus on China and Singapore. The organisation attempted to tap into the Vietnamese

market, but has struggled to gain significant headways. Penang is also facing stiff competition from other countries, with PMED identifying Singapore and India as strong competitors. As a result, hospitals in Penang are actively striving to improve and upgrade their facilities. For example, Penang Adventist Hospital recently opened an oncology specialist centre, and Island Hospital's vision of an Island Medical City—consisting of a medical complex, suites, and a hotel—will enable it to become the largest private medical hub in Malaysia. Additionally, there has been ongoing discussions to incorporate plans to build hospitals and medical facilities in Batu Kawan, with the aim of establishing a medical hub in Seberang Perai (Hilmy, 2019).

Medical tourism has not been exempted from the impact of the COVID-19 pandemic. Penang's private hospitals have experienced a significant decrease in patient numbers and revenue since the start of the pandemic. As with other sub-sectors within the tourism industry, the revival of medical tourism will hinge on containing the pandemic and the recovery of the global economy. With the Malaysian government allowing certain patients to apply for exemptions to enter the country on the basis of continuing treatment (Puvaneswary, 2020), medical tourism is on a slow path to recovery.

Meetings, incentives, conferences, and exhibitions (MICE) tourism

The globalisation and growth of international conferences and events have given birth to a specialised sub-sector of tourism, known as meetings, incentives, conferences, and exhibitions (MICE) tourism. MICE has been able to generate sizeable amounts of revenue to stimulate economic growth, especially where international delegations are concerned. MICE tourism involves large-scale movements of both individuals and companies for the purpose of partaking in meetings, exhibitions, and conferences for both professional and personal purposes.

Penang is a popular tourism destination and has emerged as a prime location for hosting international conventions and exhibitions. The SPICE Setia Convention Centre is a world-class facility with sizeable conference halls and meetings rooms, and is fully capable of hosting thousands of participants. Penang's established hospitality industry ensures the accessibility of five-star accommodations. Penang's state agency for the promotion of MICE tourism, Penang Convention and Exhibition Bureau (PCEB), is also responsible for coordinating these national and international events.

Figure 3.33 Percentage of events and EEI by type of event, Penang, 2017 and 2018
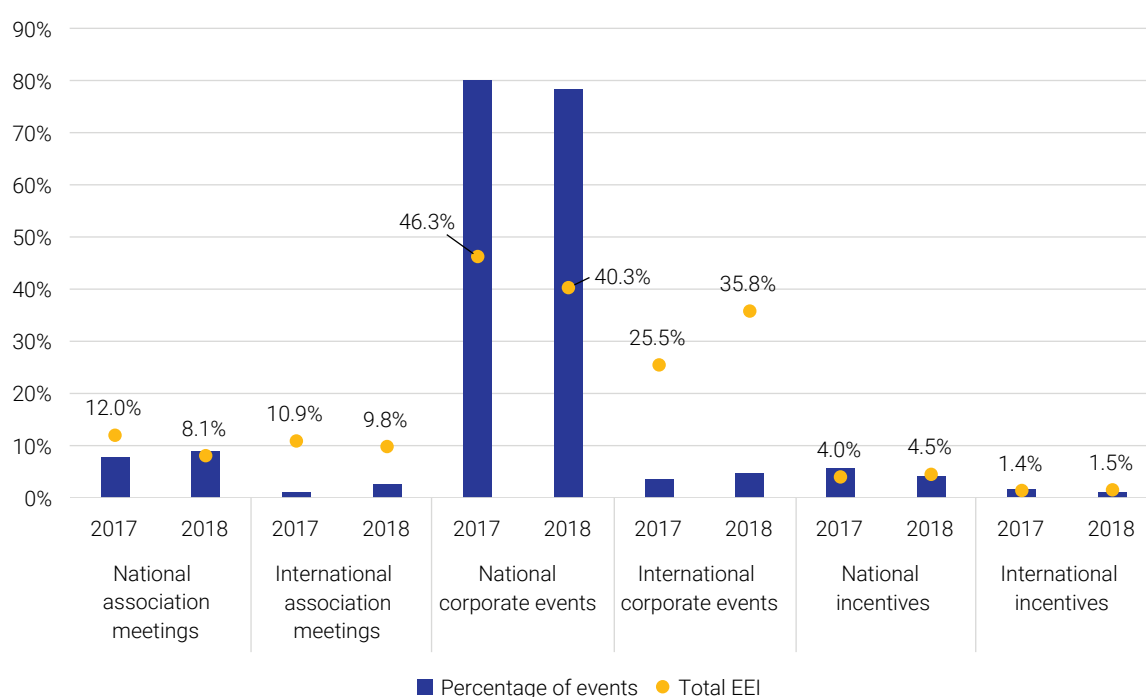
Source: Penang Institute estimates based on data from Penang Convention & Exhibition Bureau Annual Reports.

The number of events held in Penang saw an 8.8% overall growth in 2018, increasing from 2,511 events in 2017 to 2,733 events in 2018. The estimated economic impact (EEI) for MICE tourism increased significantly by 31.2%, growing from RM1.0 billion in 2017 to RM1.3 billion in 2018. As shown in Figure 3.33, national corporate events accounted for 78.3% of all events and generated an EEI of RM528.9 million, or 40.3% of total EEI. The EEI for national corporate events in 2018 held a lower share compared with 2017, but generated more revenue compared with an EEI of approximately RM463.0 million in 2017.

International corporate events ranked second in terms of number of events and EEI generated, where an increase was observed for both number of events and EEI. Although this type of event accounted for only 4.8% of total events, it recorded an EEI of RM470.1 billion, or 35.8% of total EEI.

Although there were fewer international association meetings in 2018 compared to its national association meetings, the EEI generated was higher for the former. This is in contrast with 2017, where the national type had more events and greater EEI. In terms of numbers, both events saw increases in 2018, despite holding a lower share as part of overall events. However, national meetings saw a decrease of 11.7% in EEI (dropping from RM120.0 million to RM106.0 million), while international meetings saw an increase of approximately RM20.0 million in EEI, marking an 18.3% increase.

Table 3.23 Total events and EEI by type of event and sector, 2017−18

| Sector | National | | | | | | International | | | | | |
| | Events | | | EEI | | | Events | | | EEI | | |
	2017	2018	% Growth	2017 (RM mil)	2018 (RM mil)	% Growth	2017	2018	% Growth	2017 (RM mil)	2018 (RM mil)	% Growth
Government	205	207	1.0%	71.9	69.4	-3.5%	0	10	N/A	0.0	5.0	N/A
Industry	319	332	4.1%	74.2	78.6	5.9%	44	26	-40.9%	9.0	15.3	70.0%
Education	166	238	43.4%	54.3	53.2	-2.0%	0	21	N/A	0.0	14.7	N/A
Economic	160	190	18.8%	47.1	56.6	20.2%	8	12	50.0%	12.4	5.0	-59.7%
Commerce	100	71	-29.0%	33.9	19.0	-44.0%	10	32	220.0%	264.4	386.6	46.2%
Corporate	616	399	-35.2%	86.7	60.2	-30.6%	25	6	-76.0%	34.7	1.8	-94.8%
Culture and arts	11	54	390.9%	13.4	34.9	160.4%	6	10	66.7%	25.0	64.2	156.8%
Management	213	471	121.1%	55.0	179.3	226.0%	10	36	260.0%	4.2	18.3	335.7%
General	108	133	23.1%	23.0	48.0	108.7%	4	10	150.0%	2.6	4.5	73.1%
Social Sciences	8	27	237.5%	2.7	7.7	185.2%	0	7	N/A	0.0	11.2	N/A
Science	0	8	N/A	0	1.5	N/A	2	1	-50.0%	0.9	0.4	-55.6%
Technology	90	86	-4.4%	41.2	15.2	-63.1%	6	12	100.0%	2.4	15.4	541.7%
Medical science	93	134	44.1%	28.9	37	28.0%	7	13	85.7%	7.0	52.3	647.1%
Transport and communications	28	25	-10.7%	4.7	5.1	8.5%	5	2	-60.0%	0.3	1.5	400.0%
Sports and leisure	26	78	200.0%	4.7	17.7	276.6%	7	29	314.3%	1.1	21.8	1,881.8%
Others	192	47	-75.5%	69.4	10.6	-84.7%	25	6	-76.0%	12.8	1.8	-85.9%
Total	**2,335**	**2,500**	**7.1%**	**611.1**	**694**	**13.6%**	**159**	**233**	**46.5%**	**376.8**	**619.8**	**64.5%**

Source: Penang Institute estimates based on data from Penang Convention & Exhibition Bureau Annual Reports.

Most sectors saw a growth in events and EEI for 2018, both nationally and internationally. However, a decrease in number of events was seen in corporate, transport and communications, and others for both types of events, where the EEI was also negatively affected. International events also saw a decrease of 40.9% in industry events, but its EEI increased by 70.0% (Table 3.23).

The best-performing sector for national events in 2018 in terms of numbers were management events, which saw a growth of 121.1%, as well as an increase of 226.0% in EEI. The biggest growth in events was culture and arts, which saw an increase of 43 events, or 390.9% growth. Sports and leisure events saw the biggest increase in EEI at 276.6% increase, or RM13.0 million.

For international events, the sports and leisure sector was the fastest-growing sector, with an events growth of 314.3% and an EEI growth of 1,881.8%. The commerce sector generated the most revenue, with an EEI of RM386.6 million (a 46.2% growth from 2017) from 32 events (220.0% growth from 2017).

International events have greater potential to generate larger returns to the economy, as they only accounted for 8.5% of total events held in 2018, but their total registered EEI was 41.7% of total EEI generated. Therefore, it will be important for PCEB promote Penang as a destination for MICE tourism for international audiences.

Table 3.24 Number of events and total EEI by region, Penang, 2017−18

Region	Events			EEI		
	2017	2018	% Growth	2017 (RM mil)	2018 (RM mil)	% Growth
Southeast Asia	76	119	56.6%	45.6	81.5	78.6%
APAC	38	57	50.0%	292.8	411.0	40.4%
Middle East	10	2	-80.0%	0.9	2.9	222.2%
Europe	15	7	-53.3%	5.5	4.4	-20.0%
Oceania	6	7	16.7%	2.2	2.7	22.7%
America	7	6	-14.3%	10.6	4.9	-53.8%
Others	8	35	337.5%	19.7	111.9	468.0%
Total	**160**	**233**	**45.6%**	**377.3**	**619.3**	**64.1%**

Source: Penang Institute estimates based on data from Penang Convention & Exhibition Bureau Annual Reports.

Southeast Asia remains as the region which contributed the most events for 2018, with an event growth of 56.6%, largely due to its proximity to Penang which concurrently recorded an increase of 78.6% in EEI. APAC countries also saw substantial growth of 50.0% in events and 40.4% in EEI. Within APAC countries, China was the biggest contributor, registering 36.8% of total EEI in international events (RM227.9 million). The number of events organised by Middle Eastern countries saw a decline of 80% in volume, but an increase in revenue. Other regions are smaller contributors, with most seeing decreases

in number of events and EEI, with the exception of Oceanian countries and other uncategorised countries.

The evolution of MICE tourism has a lot of economic benefits for Penang's economic growth. It has positively impacted SMEs in the hospitality and the events-planning industries, potentially increasing the number of businesses in the corresponding industries. Its contribution to Penang's tourism industry is significant, and its potential for growth should be maximized.

However, this potential has been significantly impacted by the COVID-19 pandemic. There were no conferences and exhibitions held during the lockdown, and this situation is not expected to improve greatly with the lifting of the movement restriction orders. This is because international visitors have yet to be allowed into Malaysia at the time of writing, in addition to the severe limitation of prospective participants because of social distancing measures. Furthermore, digital platforms such as Zoom have been highly utilised during this period, reducing the need for face-to-face meetings and seminars even in a post-pandemic era. Therefore, the recovery of MICE tourism is expected to be sluggish.

Box 3.4 The overall effects of COVID-19 on Penang's tourism industry

By Yap Jo-yee

The COVID-19 pandemic that struck in January 2020 has crippled the global tourism sector. Its effects are being felt acutely by establishments in Penang that have made tourism their trade. All sub-sectors of tourism are expected to be heavily impacted.

The avoidance towards travelling is expected to remain even after the pandemic, as people will remain cautious and avoid any activity that may heighten their risk of infection. The medical tourism sub-sector, which generates high returns to the state's tourism industry, is expected to see a significant drop in health tourism. MICE tourism will also suffer as a result of the pandemic, as conferences, exhibitions, and conventions are cancelled or postponed, with postponement being the best-case scenario. Ecotourism, heritage tourism, and all other sub-sectors will also be negatively impacted.

In a survey done by Penang Institute at the end of March 2020, hotels and other accommodation operators said that bookings have plummeted to zero in April, and no bookings are being made for the future. Many were laying off workers to minimise variable costs, but operators still had to deal with fixed costs such as building rental, security and maintenance fees, and so on. Tour operators and travel agencies reported a similarly bleak situation. For a sector that is wholly reliant on human movement and physical interaction, the pandemic has wiped out all revenues.

The long-term outlook for tourism is ambiguous at best. While past outbreaks such as SARS and the H1N1 influenza have shown that business activity in the tourism sectors of affected countries rebounded within six months (IATA Economics, 2020), the downturn caused by this pandemic is likely to be deeper and longer.

According to the same survey, estimates from tourism firms in Penang suggest that it will take at least six to eight months after the end of the COVID-19 pandemic for businesses to operate at normal capacity. Many past disease outbreaks were limited to particular geographical regions. SARS for example was largely contained in mainland China, Singapore, Hong Kong, Canada, and Vietnam. Even though it was not a hotspot, Malaysia's tourism sector was severely impacted because of its proximity to Singapore. Tourism activity surged after the end of that pandemic, mainly because the pandemic had not affected the health or spending power of tourists outside of the contagion regions, and these tourists had simply postponed their spending. Average occupancy rates in Penang fell from 58.2% to 47.3% during the SARS outbreak in 2002, before increasing to 62.8% immediately after (Malaysia Tourism Data, 2020).

However, it is unlikely that a similar V-shaped recovery will take place this time. The COVID-19 pandemic has created a global recession. As disposable income falls, luxury goods like overseas holidays and vacations often see a large hit in demand. It will take time for consumers to recoup their incomes before they are comfortable spending on overseas travel again. The sector is more likely to see a pickup in domestic travel first. Fortunately, Penang's tourism sector is mostly dependent on domestic tourists. In 2018, 55% of the state's hotel guests were domestic (Malaysia Tourism Promotion Board, 2018).

Fiscal and monetary policies from the government will soften the blow to the sector. In order to provide insolvent businesses with liquidity, Bank Negara Malaysia is offering emergency loans to SMEs affected by COVID-19 (as of 2015, 99% of businesses in Penang were SMEs (Department of Statistics Malaysia, 2017)), and maximum financing rates have been decreased from 3.75% to 3.50% (Bank Negara Malaysia, 2020b).

On the supply side, recovery of the sector will depend on how many businesses outlast the pandemic, and how easily others can enter (or re-enter) the sector after the crisis. Supply-chain disruptions will also have an impact. Demand-wise, it will depend largely on tourist confidence, how well foreign countries manage their domestic contagion, and tourists' disposable income after the crisis.

In an effort to aid the recovery of the tourism industry, the state government has initiated a COVID-19 safety accreditation programme, where safety and hygiene will be prioritised (Dermawan A., 2020). Hotels, shopping malls, and attractions that comply to strict safety and hygiene procedures as decided by the state government, state health department, and local councils will be given certification. The certification will be displayed at the respective premises, and standards checks will be carried out to ensure consistent compliance. This is to regain the confidence of tourists and travellers in rebooting Penang's tourism industry.

3.2.6 Education

The Eleventh Malaysia Plan stated that human capital development is one of the main pillars of building an advanced nation, thus giving education a crucial role to play. The country's emphasis on education is reflected in rising expenditure in the sector. In 2018, RM46.5 billion or about 16% of the total federal government expenditure was invested in the education sector. The share of total expenditure allocated for education further increased to 19% in 2019 and 21% in 2020 (Ministry of Finance Malaysia, 2019).

As of 2019, there were more public schools than private at all levels of education in Penang except at the tertiary level (Table 3.25). Private institutions dominated the landscape in post-secondary education. There were 30 private universities and colleges compared with 12 publicly funded ones (three public universities, three polytechnics, and six community colleges).

Table 3.25 Number of schools in Penang by type as of June 2019

Type	Public	Private	Total
Pre-school	561	459	1,020
Total (Primary and secondary)	**399**	**28**	**427**
Primary	271	3	274
Secondary	128	8	136
Mixed-level	0	17	17
Tertiary	12	30	42

Note:

1. *Public pre-schools include pre-schools annexed to the government and government-aided primary and secondary schools (under the Ministry of Education), KEMAS (under the Ministry of Rural and Regional Development), Perpaduan (under the Department of National Unity), and JAIN (under the State Religious Department), while private pre-schools include ABIM (Malaysian Islamic Youth Movement) and private kindergartens.*
2. *The number of private universities and colleges is as of 31 October 2019.*

Source: Malaysia Educational Statistics 2019, Ministry of Education (MOE) Malaysia; Statistik IPTS sehingga 31 Oktober 2019, MOE Malaysia.

There are six types of pre-schools in Malaysia, namely the pre-schools annexed to the governmental primary and secondary schools (under the Ministry of Education (MOE)), KEMAS, Perpaduan, JAIN, ABIM, and private kindergartens[30]. Public pre-schools include pre-schools under MOE, KEMAS, Perpaduan, and JAIN, while private pre-schools include ABIM and other private kindergartens[31].

Although public pre-schools outnumbered private pre-schools, as shown in Table 3.25, early childhood education in Penang was mainly supported by private education providers, with fewer parents opting for public pre-schools. Parents' preferences are reflected in the higher number of enrolments in private pre-schools compared with public ones, with the share of enrolments in private kindergartens remaining stable at around 54% (Table 3.26). This is in stark contrast with the rest of Malaysia where public pre-schools were more popular.

In contrast with pre-school, most primary and secondary students were enrolled in public schools. However, there was a positive trend in enrolments in private schools. Between 2017 and 2019, private enrolments increased by 7% annually at the primary level, and 2% at the secondary level (Table 3.26). As for the public schools, a decline in student numbers was seen in secondary schools, mainly attributed to falling number of students in regular schools.

[30] The KEMAS kindergarten is under the purview of the Ministry of Rural and Regional Development, the Perpaduan under Department of National Unity, and JAIN under the State Religious Department. In addition, ABIM kindergartens are run by the non-governmental organisation of Malaysian Islamic Youth Movement.
[31] The categorisation of public and private pre-schools is as classified by the Penang Institute. In Malaysia Educational Statistics (published by the Ministry of Education (MOE)), pre-schools are categorised under MOE and others (other ministries/governmental agencies and private institutions).

Table 3.26 Number of enrolments for pre-school, primary, and secondary levels in Penang, 2017–19

Type of school	2017	2018	2019
Pre-school			
Public	17,090 (46%)	17,099 (45%)	17,100 (46%)
Private	20,398 (54%)	20,522 (55%)	19,730 (54%)
Total	**37,488**	**37,621**	**36,830**
Primary			
Public			
National	78,532 (59%)	78,969 (59%)	79,565 (59%)
National Type (C)	46,187 (35%)	45,376 (34%)	46,080 (34%)
National Type (T)	5,264 (4%)	5,383 (4%)	5,470 (4%)
Government-aided religious school (GARS)	358 (0.3%)	357 (0.3%)	358 (%)
Special Education	114 (0.1%)	105 (0.1%)	102 (%)
Private	3,020 (2%)	3,293 (2%)	3,467 (3%)
Total	**133,475**	**133,483**	**135,042**
Secondary			
Public			
Regular	99,440 (83%)	96,296 (82%)	93,526 (82%)
Fully residential	1,232 (1%)	1,335 (1%)	1,305 (1%)
Religious	2,452 (2%)	2,364 (2%)	2,463 (2%)
Government-aided religious school (GARS)	3,467 (3%)	3,495 (3%)	3,499 (3%)
Special education	133 (0.1%)	141 (0.1%)	126 (%)
Technical	559 (0.5%)	509 (0.4%)	513 (%)
Vocational college	3,498 (3%)	3,322 (3%)	2,849 (2%)
Form six college	324 (0.3%)	316 (0.3%)	691 (1%)
Private	9,103 (8%)	9,382 (8%)	9,470 (8%)
Total	**120,208**	**117,160**	**114,442**

Note: The number of enrolments in regular schools includes special model schools, sports schools, arts schools, and Bimbingan Jalinan Kasih Schools (BJKS).
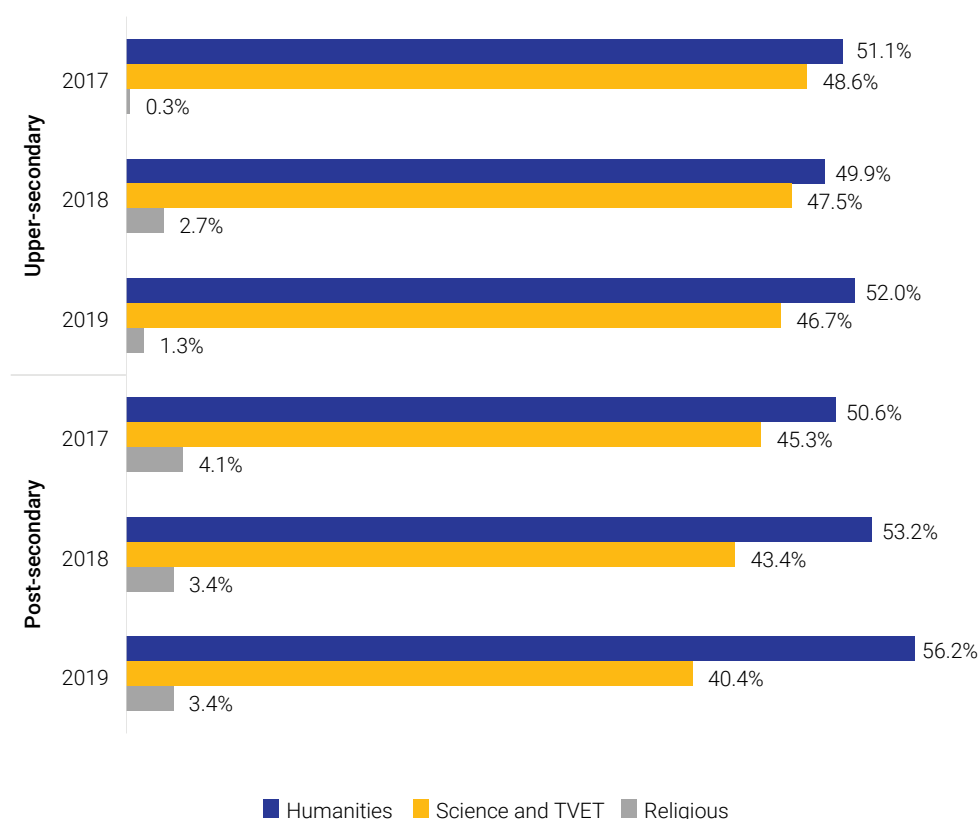*Source: Malaysia Educational Statistics 2017–2019, Ministry of Education Malaysia.*

The proportion of students who opted for science and Technical and Vocational Education and Training (TVET)[32] declined at both upper and post-secondary levels[33], while the share for humanities has increased continuously (Figure 3.34). Given the increasing need for skilled workforce in the face of Industrial Revolution 4.0, the decline in enrolments for science and TVET is concerning. Appropriate policies need to be put in place to remedy this situation.

[32] Technical and Vocational Education and Training (TVET) includes MPV, PVMA, technology, technical, skills, and VCM programmes.
[33] Refers to government and government-aided schools only.

Figure 3.34 Share of students' enrolments by field of study at upper and post-secondary levels in government and government-aided schools in Penang, 2017–19

Source: Malaysia Educational Statistics 2017–2019, Ministry of Education Malaysia.

Within Malaysian public universities alone, the most preferred fields of Penang-born students were Social Science, Business, and Law. In 2018, 33.5% of total enrolments were in these fields, followed by Engineering, Manufacturing, and Construction (25.7%) and Science, Mathematics, and Computing (15.3%).

In 2018, graduating classes for the three-most-popular fields were smaller than their new intakes, leading to higher enrolment numbers (Table 3.27). The total number of graduates for all fields increased by almost 3% to 5,958. As expected, Social Science, Business, and Law; Engineering, Manufacturing, and Construction; and Science, Mathematics, and Computing made up the three-largest proportions of graduates. All fields experienced an increase except Social Science, Business, and Law and Science, Mathematics, and Computing, which decreased by 7.2% and 3.4%, respectively. The two fields with
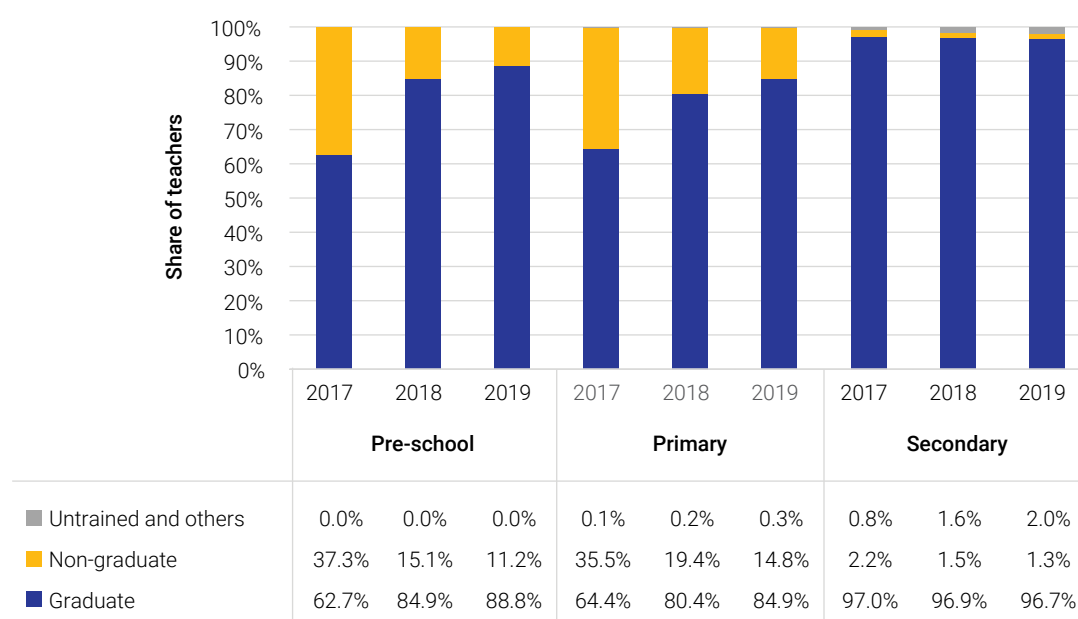
the lowest number of enrolments, Agriculture and Veterinary and Services, saw the largest increments of 66% and 59%, respectively.

Although highly qualified teachers do not necessarily equate to good teaching outcome, having requirements for teacher qualifications shows a recognition of teaching as a profession and, to some extent, improves teaching quality. At pre-school and primary levels, the share of teachers with graduate backgrounds improved significantly, from slightly below 65% in 2017 to more than 80% in 2019. This suggests that more graduates are choosing to engage in the education sector, or that teachers proactively upskilled themselves while in service. On the other hand, while secondary schools had the largest share of graduate teachers, it also had the most number of untrained, reappointed, and contract teachers (Figure 3.35).

Table 3.27 Number of Penang-born intakes, enrolments, and graduates in all public universities in Malaysia by field of study, 2017−18

| Field of study	Intakes (%)		Enrolments (%)		Graduates (%)	
	2017	2018	2017	2018	2017	2018
Social Sciences, Business, and Law	2,879 (35.1%)	2,776 (34.6%)	8,620 (32.9%)	8,825 (33.5%)	2,087 (36.1%)	1,937 (32.5%)
Engineering, Manufacturing, and Construction	1,932 (23.6%)	1,889 (23.6%)	6,747 (25.8%)	6,784 (25.7%)	1,424 (24.6%)	1,518 (25.5%)
Science, Mathematics, and Computing	1,387 (16.9%)	1,270 (15.8%)	3,933 (15.0%)	4,027 (15.3%)	876 (15.1%)	846 (14.2%)
Health and Welfare	517 (6.3%)	516 (6.4%)	2,050 (7.8%)	2,036 (7.7%)	433 (7.5%)	478 (8.0%)
Arts and Humanities	643 (7.8%)	593 (7.4%)	2,075 (7.9%)	1,995 (7.6%)	387 (6.7%)	470 (7.9%)
Education	414 (5.1%)	502 (6.3%)	1,461 (5.6%)	1,452 (5.5%)	375 (6.5%)	376 (6.3%)
Services	302 (3.7%)	334 (4.2%)	846 (3.2%)	875 (3.3%)	143 (2.5%)	227 (3.8%)
Agriculture and Veterinary	118 (1.4%)	114 (1.4%)	427 (1.6%)	362 (1.4%)	64 (1.1%)	106 (1.8%)
General programmes	2 (0.0%)	22 (0.3%)	2 (0.0%)	23 (0.1%)	0 (0.0%)	0 (0.0%)
Total number of students	**8,194**	**8,016**	**26,161**	**26,379**	**5,789**	**5,958**
Growth rate (%)	**6.2%**	**-2.2%**	**2.0%**	**0.8%**	**-14.1%**	**2.9%**

Source: Ministry of Education, Malaysia.

Figure 3.35 Share of teachers in government and government-aided schools in Penang for pre-school, primary, and secondary levels by qualification, 2017−19

	Pre-school			Primary			Secondary		
	2017	2018	2019	2017	2018	2019	2017	2018	2019
■ Untrained and others	0.0%	0.0%	0.0%	0.1%	0.2%	0.3%	0.8%	1.6%	2.0%
■ Non-graduate	37.3%	15.1%	11.2%	35.5%	19.4%	14.8%	2.2%	1.5%	1.3%
■ Graduate	62.7%	84.9%	88.8%	64.4%	80.4%	84.9%	97.0%	96.9%	96.7%

Note: 1. Pre-school level includes pre-schools annexed to the public primary and secondary schools only.
2. Others are reappointed and contract teachers.
Source: Malaysia Educational Statistics 2017−2019, Ministry of Education Malaysia.

Figure 3.36 Number of enrolments in institutes of teacher education by state, 2017−19
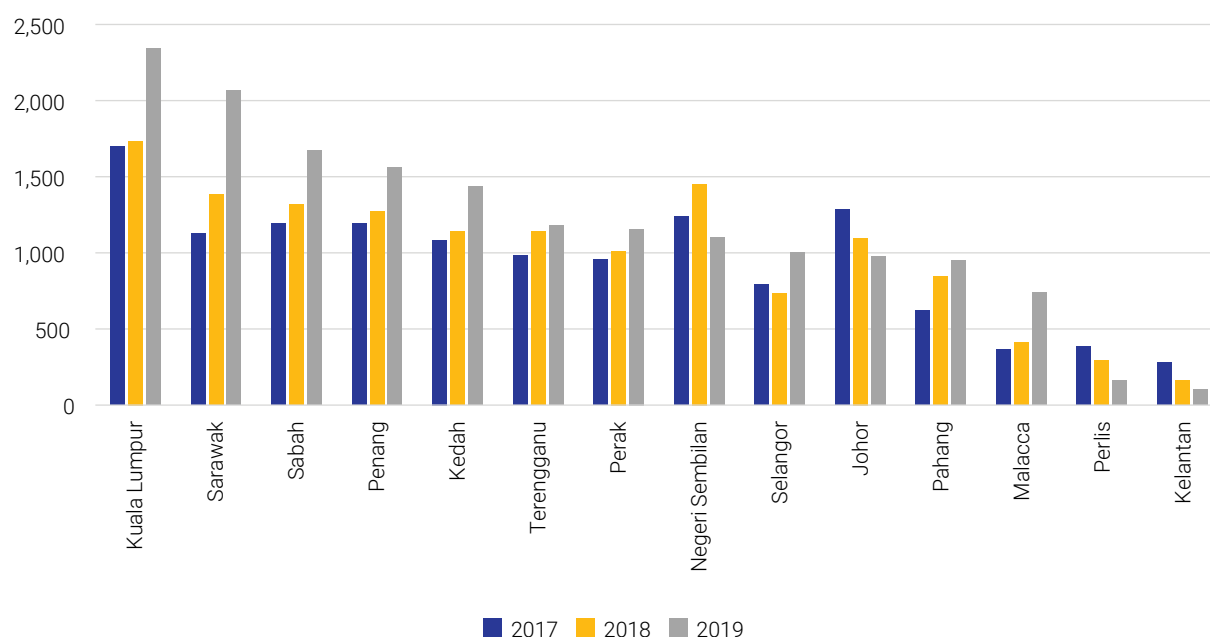
Source: Malaysia Educational Statistics 2017−2019, Ministry of Education Malaysia.

Along with the increased share of graduate teachers, total enrolment in teacher education institutes in Malaysia increased by 11.6% per year on average, from 13,198 in 2017 to 16,441 in 2019. All states showed growing enrolments from 2017 to 2019, except Negeri Sembilan, Johor, Perlis, and Kelantan (Figure 3.36).

While there was a larger supply of teachers (proxy by enrolments in teacher education institutes), the share of young teachers in Penang was relatively low compared with the country. As of 2018, only 7.3% of the state's teachers were below the age of 30, compared with the national figure of 9.6%. On the other hand, the proportion of teachers in Penang aged above 50 accounted for about 23% (Table 3.28). However, there is no indication of an ageing workforce for both primary and secondary schools. Between 2016 and 2018, the share of older teachers fell while that of young teachers grew steadily[34].

Table 3.28 Share of teachers aged 30 years old and below (<=30) and aged above 50 years old (>50) against the total number of teachers in Penang and Malaysia, 2016−18

Level of education	Year	Penang		Malaysia	
		<=30	>50	<=30	>50
Primary	2016	5.5%	24.2%	9.9%	20.9%
	2017	5.8%	24.0%	9.4%	21.9%
	2018	7.1%	21.4%	10.5%	20.1%
Secondary	2016	6.3%	25.5%	7.0%	23.8%
	2017	6.6%	26.8%	7.2%	25.5%
	2018	7.5%	24.3%	8.5%	23.1%
Total	**2016**	**5.9%**	**24.8%**	**8.7%**	**22.2%**
	2017	**6.2%**	**25.3%**	**8.5%**	**23.5%**
	2018	**7.3%**	**22.8%**	**9.6%**	**21.4%**

Note: (A) Penang Institute estimates based on data from the Ministry of Education (data for number of teachers aged 30 years old and below and above 50 years old). (B) Malaysia Educational Statistics 2016−2018 (data for total number of teachers).
Source: Ministry of Education, Malaysia.

[34] The age groups of 30 years old and below and 50 years old and above were used to measure the ageing teacher workforce based on main reference to Education at a Glance 2019: OECD Indicators (https://www.oecd-ilibrary.org/education/education-at-a-glance_19991487).

3.2.7 Public safety and security

Public safety refers to the welfare and protection of the general public which is mainly expressed as a governmental responsibility. Public safety and security significantly affect well-being and quality of life. It plays an important role in supporting economic growth and development by minimising the cost of crime and improving the desirability of communities as places to live and locate businesses (Keeling & Cleverley, 2012).

There is an economic and social cost for each incident of crime and response. It includes direct costs (immediate impact) and indirect costs (e.g., fear of crime, lower life satisfaction level, psychological issues, decreased quality of life, and other non-monetary costs). Furthermore, dealing with crime adds a burden to the government expenditure which is mostly due to the costs of increasing the number of police officers, imprisonment, providing mental health services, and organising campaigns and programmes designed against criminal activities (Ishak & Bani, 2017).

Crime, drug addiction, and law enforcement

The crime index ratio per 100,000 population[35] in Penang in 2018 improved to 284.6 compared with 2017 (318.3), but this is still above the national level (273.8).

Crime index consists of two categories: violent crime and property crime. In 2018, the number of violent crimes dropped by 17.4% compared with 2017, which is mainly due to the result of a significant decrease in the number of gang robberies without firearms (37.4%), followed by robberies without firearms (11.1%) and rape (10%). However, the number of murders increased by about 23.5% during the same period. Timur Laut has the most number of violent crimes (283), followed by Seberang Perai Tengah (268). The total number of violent crimes declined in all districts in 2018 compared with the previous year (Table 3.29).

Table 3.29 Number of violent crimes by district and type of crime, Penang 2016−18

District	Year	Murder	Rape	Gang robbery		Robbery		Causing injury*	Total
				With firearms	Without firearms	With firearms	Without firearms		
Timur Laut	2016	10	10	2	92	-	84	111	**309**
	2017	6	13	-	140	-	107	104	**370**
	2018	6	15	-	78	-	106	78	**283**
Barat Daya	2016	3	11	-	28	-	17	31	**90**
	2017	-	11	-	35	-	10	33	**89**
	2018	1	7	-	18	-	6	32	**64**
Seberang Perai Selatan	2016	3	10	-	66	-	17	39	**135**
	2017	3	7	-	74	-	20	34	**138**
	2018	2	14	-	40	-	23	46	**125**
Seberang Perai Tengah	2016	8	23	-	151	-	69	87	**338**
	2017	6	35	-	168	-	62	51	**322**
	2018	7	12	-	129	-	38	82	**268**
Seberang Perai Utara	2016	4	11	-	69	1	37	44	**166**
	2017	2	14	-	64	-	26	53	**159**
	2018	5	24	-	36	1	27	57	**150**
Penang	**2016**	**28**	**65**	**2**	**406**	**1**	**224**	**312**	**1,038**
	2017	**17**	**80**	**-**	**481**	**-**	**225**	**275**	**1,078**
	2018	**21**	**72**	**-**	**301**	**1**	**200**	**295**	**890**

*Note: * "Causing injury" includes causing bodily injury, injury during gang robbery with firearms, gang robbery without firearms, robbery with firearms, and robbery without firearms.*
Source: Royal Malaysia Police.

[35] Crime index ratio per 100,000 populations = (Total crime index/Total population) * 100,000

In 2018, property crime in Penang dropped by nearly 8% compared with 2017, largely owing to the decline in vehicle theft, particularly motorcycles/scooters. Vehicle theft contributed about 58% to overall property crime. All districts saw a notable reduction in property crime over the three-year period (Table 3.30).

Table 3.30 Property crime by district and type of crime, Penang, 2016−18

District	Year	House break-in and theft	Vehicles theft			Snatch	Other theft	Total
			Lorry/van	Motorcar	Motorcycle/ scooter			
Timur Laut	2016	210	12	116	627	77	358	**1,400**
	2017	194	17	67	629	-	271	**1,178**
	2018	193	25	92	485	1	284	**1,080**
Barat Daya	2016	55	7	39	224	15	108	**448**
	2017	81	6	43	225	3	74	**432**
	2018	70	7	53	189	3	105	**427**
Seberang Perai Selatan	2016	118	8	32	136	10	66	**370**
	2017	123	6	17	107	1	81	**335**
	2018	126	9	7	70	-	79	**291**
Seberang Perai Tengah	2016	336	58	191	917	61	309	**1,872**
	2017	305	22	149	817	3	285	**1,581**
	2018	306	20	140	754	1	255	**1,476**
Seberang Perai Utara	2016	198	25	71	497	28	169	**988**
	2017	165	15	81	544	4	139	**948**
	2018	160	15	58	488	7	125	**853**
Penang	**2016**	**917**	**110**	**449**	**2,401**	**191**	**1,010**	**5,078**
	2017	**868**	**66**	**357**	**2,322**	**11**	**850**	**4,474**
	2018	**855**	**76**	**350**	**1,986**	**12**	**848**	**4,127**

Source: Royal Malaysia Police.

Figure 3.37 Drug addicts by state, 2016−18
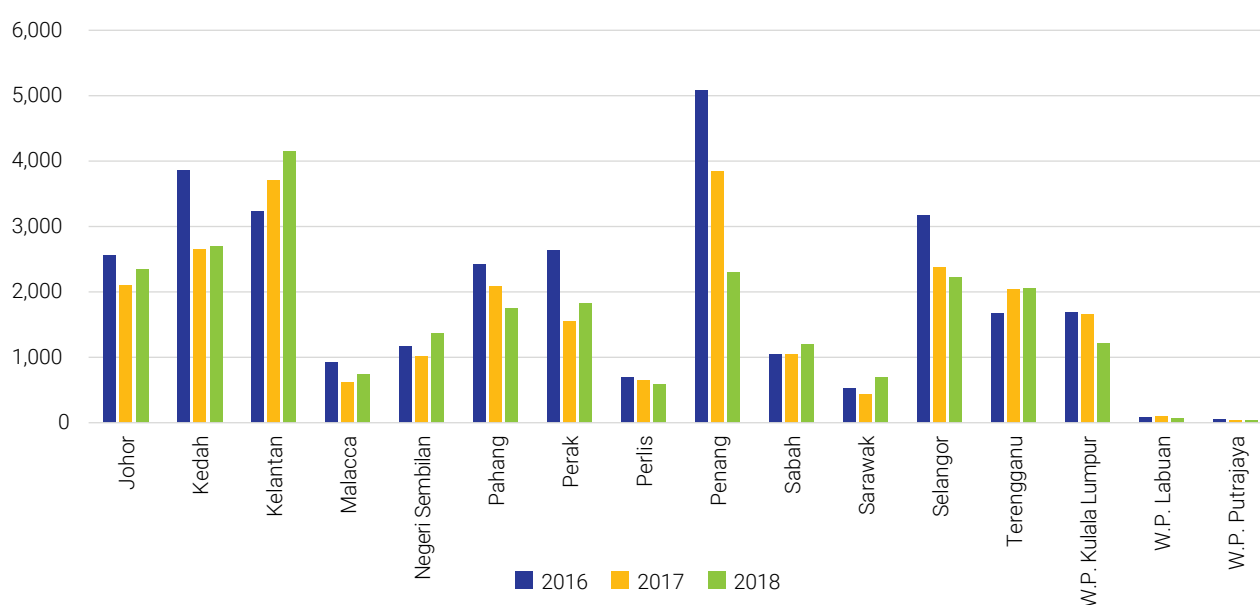
Source: National Anti-Drugs Agency.

Over the past three years, the number of drug addicts in Penang has halved, dropping from 5,081 in 2016 to 2,303 in 2018. The overwhelming majority of drug addicts were males (96.7%). In 2018, Penang recorded the fourth-highest number of drug addicts in the country after Kelantan (4,153), Kedah (2,693), and Johor (2,352) (Figure 3.37).

As presented in Figure 3.38, Timur Laut has the most police stations and police beats in Penang.

However, there is only one community police station in this district compared with other districts. Community-oriented policing is an effective strategy for policing at the local level that engages ordinary citizens as well as retired police officers in a partnership approach to identify and prioritise crime and social disorder that affect the local neighbourhood. The number of police beats is almost constant across all districts.

Figure 3.38 Number of police stations, beats, and force strength, Penang, 2017
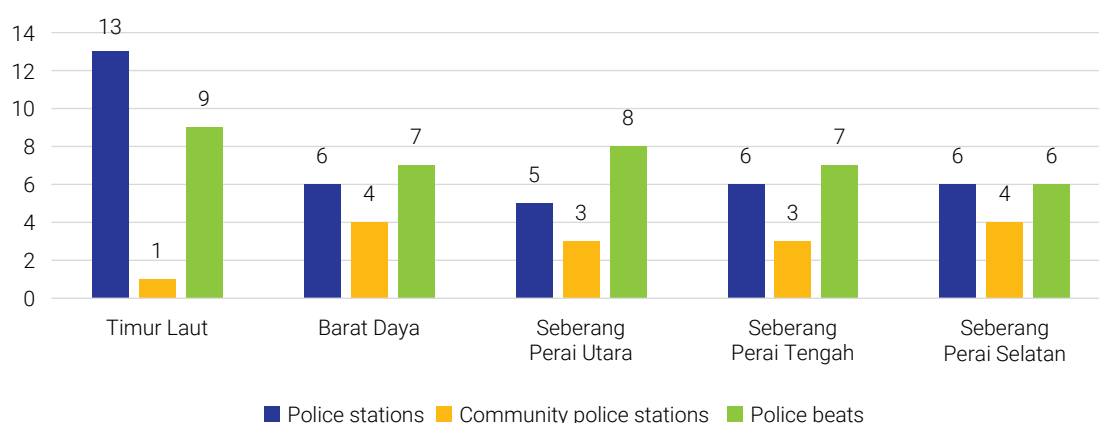
Source: Royal Malaysian Police, Penang.

Road accident and safety

Road accidents have been identified as the eighth-leading cause of death in the world (Ministry of Transport Malaysia, 2020). In 2017, the total number of road accidents in Penang increased by about 1.8% compared with 2016. The highest number of road accidents was reported for Timur Laut (15,840), followed by Seberang Perai Tengah (12,321) and Seberang Perai Utara (5,915) (Figure 3.39). Nearly 67% of road accidents in 2017 involved cars, followed by motorcycles (21.3%).

Figure 3.39 Number of road accidents reported by district, Penang 2013−17
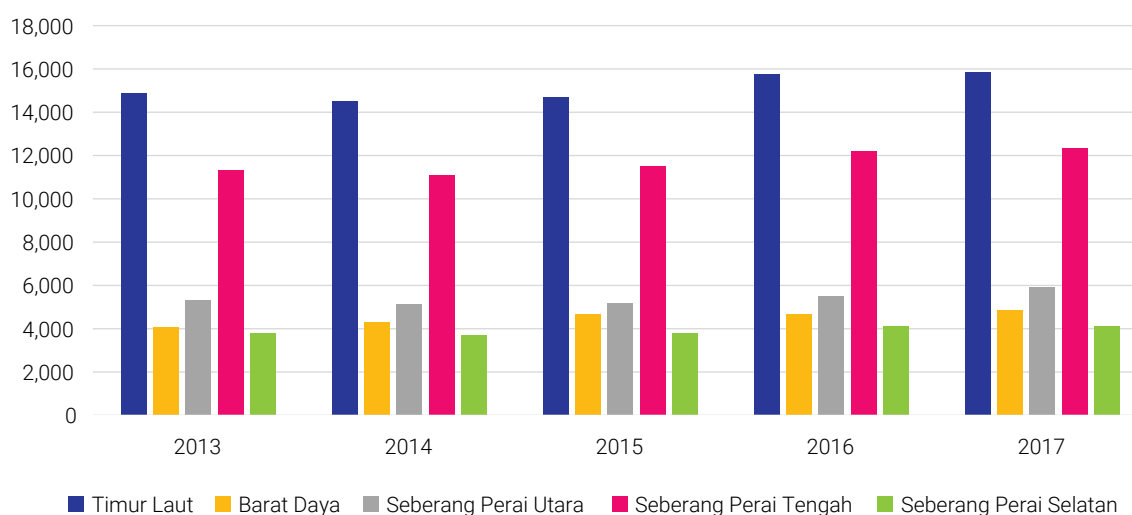
Source: Royal Malaysian Police, Penang.

In 2017, despite the increase in total road accidents, the number of deaths and serious injuries due to road accidents in Penang declined by about 2.4% and 29.7%, respectively, compared with 2016, which is relative to the number of motor vehicles during the same period (Table 3.31 and Figure 3.40). This suggests some progress in mitigating the adverse effects of increasing motorised transport. In an effort to address the issue of road accidents, the federal government, through the relevant agencies, have been designing and implementing road safety initiatives that include five elements: education, enforcement, engineering, environmental, and evaluation (Ministry of Transport Malaysia, 2020).

Table 3.31 Number of death and injuries in road accidents reported, Penang 2013–17

Type of accidents	2013	2014	2015	2016	2017
Deaths	381	378	360	411	401
Serious injuries	147	178	186	259	182
Minor injuries	94	194	160	339	130
Total death/injuries	**622**	**750**	**706**	**1,009**	**713**
Total road accident	**39,361**	**38,747**	**39,856**	**42,244**	**43,007**

Source: Bukit Aman Traffic Department.

Figure 3.40 Number of motor vehicles, Penang 2013–19
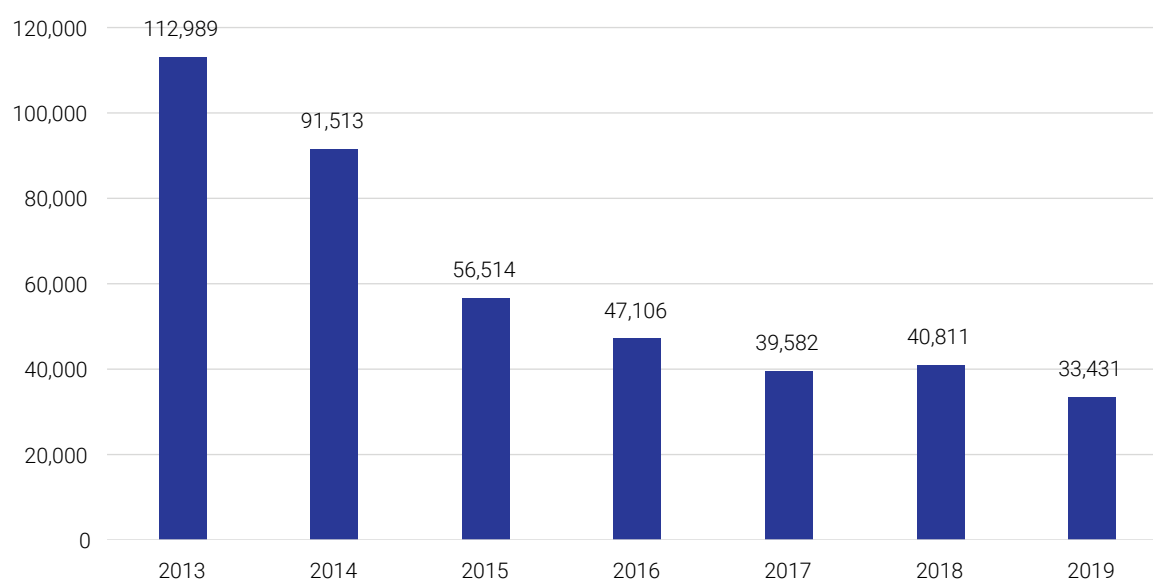
Source: Road Transport Department, Malaysia.

Fire and safety

There are 18 fire stations in Penang. In 2017, the highest number of firemen was recorded for Timur Laut (231), followed by Seberang Perai Tengah (199), while Seberang Perai Selatan (50) had the fewest. As presented in Figure 3.41, the majority of fire cases in Penang were caused by forest and bush fires (30%), followed by building fires (18%). The total number of fire cases in Penang dropped by nearly 39% in 2017 compared with 2016, mainly because of a significant decline (82.5%) in cases caused by issues of machineries and tools. The total number of crank calls also decreased by 42.4% during the same period.

Between 2016 and 2017, the number of injuries resulting from fires decreased negligibly from 34 to 32. However, the number of deaths increased from four to seven.

Figure 3.41 Fire cases by types in Penang, 2017
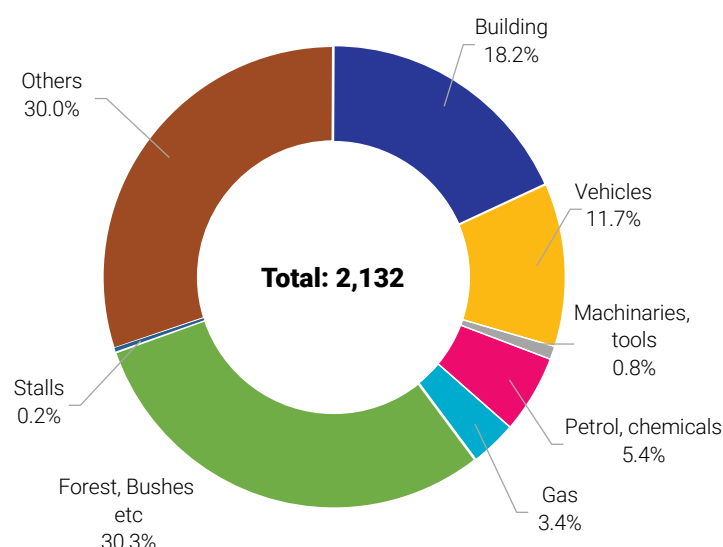
Source: Fire and Rescue Department, Penang.

3.2.8 Healthcare

There is a strong correlation between the performance of the health industry and the strength of the economy. A country with sustained economic development and growth will allow more investment into healthcare, as national income has a direct effect on healthcare spending and the improvement of health systems. A healthy nation ensures a strong workforce, which in turn raises productivity and promote economic growth.

Table 3.32 Principal statistics of health and social work services by state, Malaysia, 2015−17

States	Value of gross output (RM'000)			Value of intermediate input (RM'000)			Value added RM ('000)		
	2015	2017	CAGR	2015	2017	CAGR	2015	2017	CAGR
Johor	1,626,029	1,934,240	9.1%	882,284	1,033,693	8.2%	743,745	900,547	10.0%
Kedah	539,523	612,575	6.6%	291,326	326,377	5.8%	248,197	286,198	7.4%
Kelantan	218,919	264,192	9.9%	117,480	141,017	9.6%	101,439	123,175	10.2%
Malacca	777,128	891,744	7.1%	378,997	439,081	7.6%	398,131	452,663	6.6%
Negeri Sembilan	563,080	675,469	9.5%	316,481	383,620	10.1%	246,599	291,849	8.8%
Pahang	384,386	461,229	9.5%	216,895	250,632	7.5%	167,491	210,597	12.1%
Penang	**1,928,513**	**2,398,227**	**11.5%**	**1,053,915**	**1,297,322**	**10.9%**	**874,598**	**1,100,906**	**12.2%**
Perak	1,052,886	1,262,811	9.5%	559,322	669,015	9.4%	493,564	593,796	9.7%
Perlis	26,230	31,242	9.1%	13,122	15,654	9.2%	13,108	15,588	9.1%
Selangor	4,585,583	5,590,936	10.4%	2,348,312	2,879,842	10.7%	2,237,271	2,711,094	10.1%
Terengganu	143,976	172,103	9.3%	72,466	86,320	9.1%	71,510	85,783	9.5%
Sabah	447,638	542,766	10.1%	244,269	292,610	9.4%	203,369	250,156	10.9%
Sarawak	640,018	735,349	7.2%	320,561	360,335	6.0%	319,457	375,013	8.3%
*Kuala Lumpur	3,878,114	4,603,680	9.0%	2,021,072	2,414,711	9.3%	1,857,042	2,188,969	8.6%
*Labuan	18,933	21,351	6.2%	8,796	9,919	6.2%	10,137	11,432	6.2%
*Putrajaya	17,068	20,361	9.2%	7,157	8,425	8.5%	9,911	11,935	9.7%
Total	**16,848,024**	**20,218,274**	**9.5%**	**8,852,455**	**10,608,573**	**9.5%**	**7,995,569**	**9,609,701**	**9.6%**

*Note: * denotes Federal Territories*
Source: Penang Institute estimates based on data from Department of Statistics, Malaysia.

Based on Table 3.32, the value of gross output for Penang in terms of health and social work services was approximately RM2.4 billion in 2017, a 24.4% increase from 2015 and at a CAGR of 11.5%. The CAGR for Penang was the highest among all states, and it was also higher than the national CAGR of 9.5%. Selangor and Johor, which are similarly developed states, saw CAGRs of 10.4% and 9.1%, respectively, although Selangor's value of gross output was much higher. Kedah had the lowest CAGR for a state[36] at 6.6%.

For the same year, Selangor recorded the highest value-added for health and social work services, which amounted to approximately RM2.7 billion. This represented an increase of 21.2% and a CAGR of 10.1%. Penang, however, had a much higher CAGR of 12.2%, which again was the highest among all states. Perlis ranked the lowest with only RM15.6 million in value-added, but its CAGR of 9.1% is higher than

Kedah and Malacca.

Medical tourism contributes substantial revenues towards Penang's economy; private hospital services account for a large share of total value-added for health and social work services for the state.

Healthcare facilities and allocation

There are seven public hospitals in Penang—one for each district except Seberang Perai Tengah, which has two (Table 3.33). Seberang Jaya had the highest number of community clinics (33.3%) in 2019, while Timur Laut had the lowest number (6.7%). Each district, with the exception of Seberang Perai Utara, had at least one maternal and child health clinic, with Timur Laut housing three such clinics. Timur Laut also had the highest number of health clinics (29.0%) and dental clinics (25.0%).

Table 3.33 Public health institutions in Penang by type and district, 2019

Health institution	Timur Laut	Barat Daya	Seberang Perai Utara	Seberang Perai Tengah	Seberang Perai Selatan
Hospital	1	1	1	2	1
1Malaysia clinic	4	3	7	5	4
Community clinic	4	12	20	13	11
Health clinic	9	3	7	7	5
Maternal and child health clinic	3	1	0	1	1
Dental clinic	7	4	6	6	5
Specialist dental clinic	5	0	3	6	0
Total	**33**	**24**	**44**	**40**	**27**

Source: Health Facts 2019, Penang State Health Department.

Table 3.34 Private health institutions in Penang by type and district, 2019

Health institution	Timur Laut	Barat Daya	Seberang Perai Utara	Seberang Perai Tengah	Seberang Perai Selatan
Hospital	12	2	1	5	0
GP clinic	199	92	83	152	54
Hospice	1	0	0	0	0
Private hemodialysis centre	11	5	9	12	5
Ambulatory Care Centre (ACC)	5	0	2	3	0
Private dental clinic	76	42	26	36	5
Total	**304**	**141**	**121**	**208**	**64**

Source: Health Facts 2019, Penang State Health Department.

[36] Federal territories are not included as states.

Private hospitals are highly concentrated in Timur Laut. There were 12 private hospitals in the district in 2019, or 60% of the state total. GP clinics and private dental clinics in the district also outnumbered the rest of its counterparts. Seberang Perai Tengah accommodated a large number of private health facilities, coming in second after Timur Laut. Seberang Perai Selatan, on the other hand, had the fewest private health institutions.

Table 3.35 Financial allocation for public hospitals in Penang, 2017−18

Hospital	2017			2018		
	Emolument (RM '000)	Expenditure (RM '000)	Development (RM '000)	Emolument (RM '000)	Expenditure (RM '000)	Development (RM '000)
Penang General Hospital	289,259.20	520,177.00	2,125.60	288,679.70	569,034.00	2,896.20
Seberang Jaya Hospital	122,381.30	60,849.10	971.50	119,852.90	198,019.10	1,576.10
Bukit Mertajam Hospital	49,788.60	32,096.00	581.30	54,890.20	90,288.30	1,016.40
Kepala Batas Hospital	31,183.00	19,858.90	79.50	35,371.50	61,313.60	684.50
Sungai Bakap Hospital	21,668.00	10,675.20	15.00	23,078.40	35,215.60	328.20
Balik Pulau Hospital	17,752.00	8,620.50	26.10	18,595.60	28,164.40	702.90
Total	**532,032.20**	**652,276.60**	**3,799.00**	**540,468.30**	**982,035.00**	**7,204.30**

Source: Health Facts 2018−2019, Penang State Health Department.

Penang General Hospital is the largest public hospital in the northern region of Malaysia; the hospital not only serves patients from Penang, but also patients from Perlis, Kedah, and Perak when they need specific medical services. Therefore, it is no surprise that the allocation for this hospital was the highest across emoluments, expenditure, and development for both 2017 and 2018 (Table 3.35). Seberang Jaya Hospital had the second-highest share of financial allocation, while Balik Pulau Hospital, being the smallest, had the lowest share.

Table 3.36 Percentage change in financial allocation for public hospitals in Penang, 2017−18

Hospital	% Change		
	Emolument	Expenditure	Development
Penang General Hospital	-0.2%	9.4%	36.3%
Seberang Jaya Hospital	-2.1%	225.4%	62.2%
Bukit Mertajam Hospital	10.2%	181.3%	74.9%
Kepala Batas Hospital	13.4%	208.7%	761.0%
Sungai Bakap Hospital	6.5%	229.9%	2,088.0%
Balik Pulau Hospital	4.8%	226.7%	2,588.5%
Total	**1.6%**	**50.6%**	**89.6%**

Source: Penang Institute estimates based on data from Health Facts 2018−2019, Penang State Health Department.

Table 3.36 shows that allocation for public hospitals in Penang generally increased across the board for 2018, with the exception of negligible decreases in emoluments for Penang General Hospital and Seberang Jaya Hospital at 0.2% and 2.1%, respectively. This was to the result of an additional RM7 billion for the Ministry of Health in the federal budget for 2018. The increase in emoluments was the biggest for Kepala Batas Hospital at 13.4%, while Sungai Bakap Hospital saw the biggest increase for allocation in expenditure at 229.9%. As for development allocations, Balik Pulau Hospital saw a significant increase of 2,588.5%, going from RM26.1 million to RM702.9 million, largely due to the upgrading and expansion work scheduled for the Emergency and Outpatient Department of the hospital (Basyir, 2020). Despite being the biggest hospital in Penang, Penang General Hospital had the lowest increase in allocation.

Figure 3.42 Revenue collection by public hospitals in Penang, 2017−18
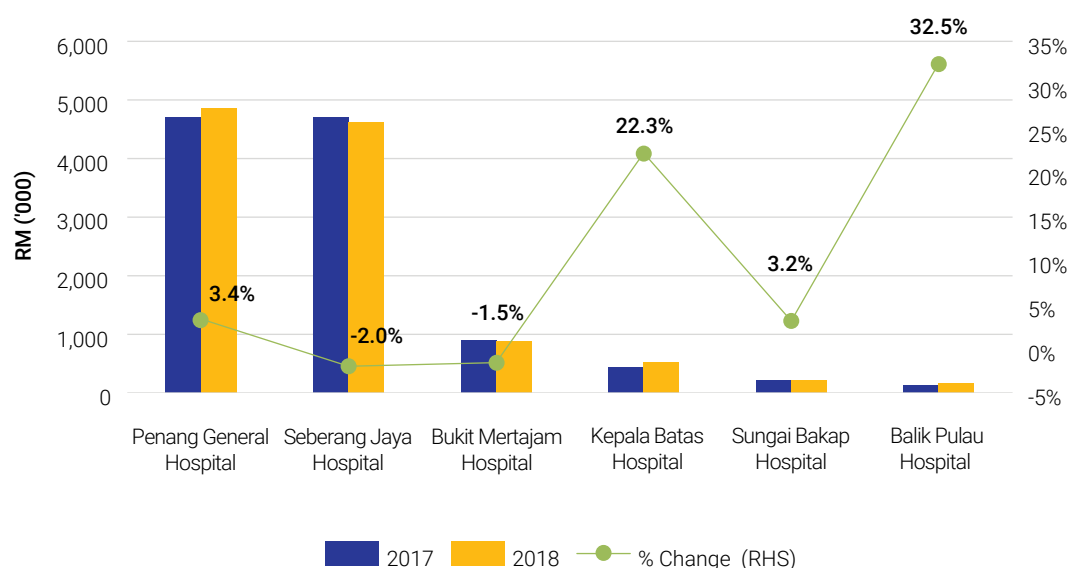
Source: Penang Institute estimates based on data from Health Facts 2018−2019, Penang State Health Department.

Penang General Hospital collected the most revenue in 2018 at approximately RM4.87 million, an increase of 3.4% over the previous year (Figure 3.42). Balik Pulau Hospital saw the biggest increase, but from a small base (RM169,660 in 2018). Elsewhere, decreases in revenue collection were seen for both Seberang Jaya Hospital (-2.0%) and Bukit Mertajam Hospital (-1.5%).

Healthcare demand and utilization

The availability of inpatient services is indicated by the number of hospital beds. The total number of beds in Penang increased in 2016, before seeing a negligible decline of 12 beds in 2018 (Figure 3.43). This decrease is attributed to private hospital beds. It interesting to note that there were more hospital beds in 2014 compared with 2018. For the latter year, there were 2.4 beds per 1,000 population[37] for both private and public hospitals combined; individually, public and private hospital beds had 1.2 beds to 1,000 population each.

Bed occupancy rates (BOR) are used to evaluate the capacity of a hospital to function safely and efficiently. Some clinical observations[38] have suggested that a BOR of above 85% indicates bed shortages, which could adversely affect hospital functions (Keegan, 2010). The BOR for public hospitals in Penang was the highest in 2014, at 76.8%. It gradually decreased over the next three years before increasing to 73.6% in 2018.

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[37] The parameters of hospital beds per population is as defined World Health Organisation (WHO), retrieved from https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3119#

[38] The Australian Medical Association, Irish Medical Association, and the Australasian College for Emergency Medicine regard a bed-occupancy rate greater than 85% to be detrimental towards the safe and efficient operation of a hospital. Additionally, the United Kingdom Department of Health has indicated that bed-occupancy rates greater than 85% in acute care hospitals can potentially cause problems in handling both emergency and elective admissions (Keegan, 2010).

Figure 3.43 Number of beds per 1,000 population by sector, Penang, 2014−18
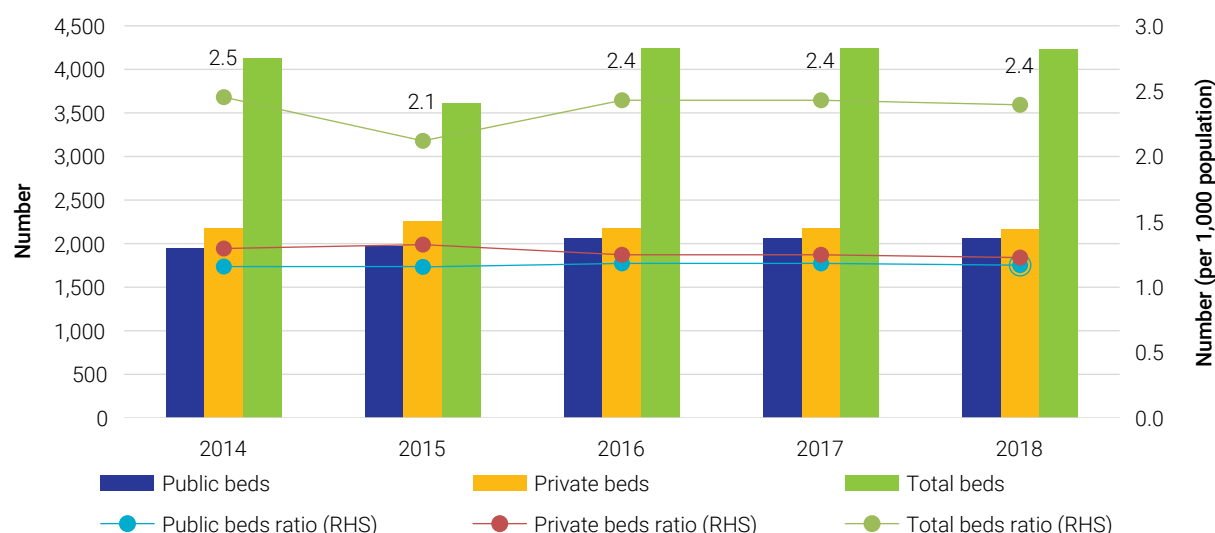
Source: Penang Institute estimates based on data from Health Indicators 2015−2019, Ministry of Health, Malaysia.

Figure 3.44 Bed occupancy rate (BOR) in public health by hospital, Penang, 2014−19
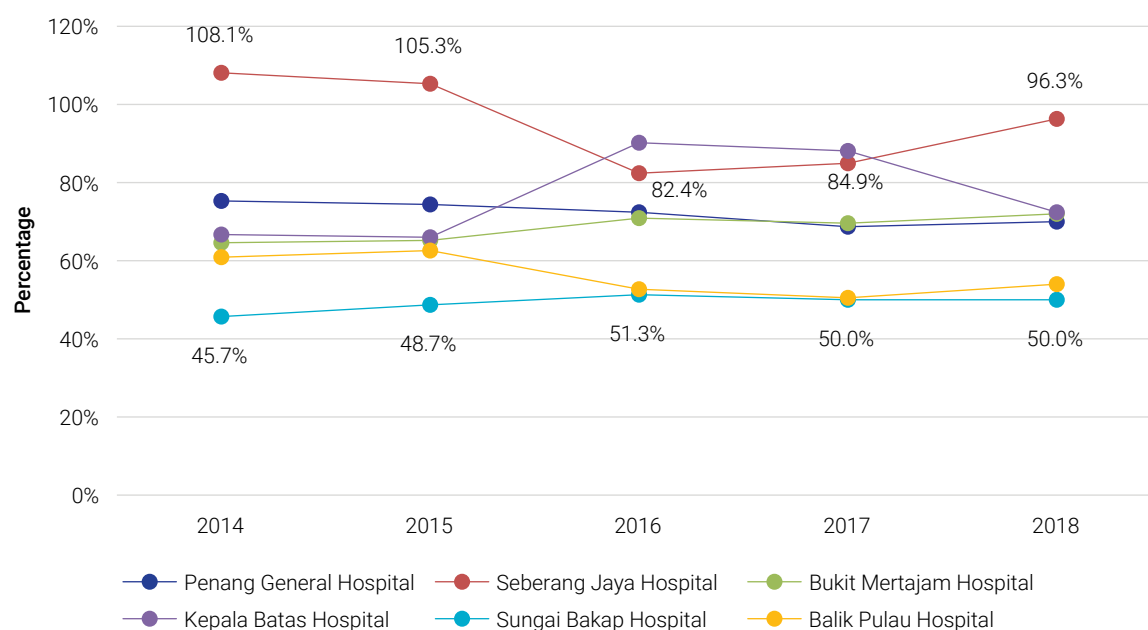
Source: Annual Health Report 2019, Penang State Health Department.

However, hospitals individually had different BORs. Penang General Hospital maintained a BOR of 72.2% over a five-year period. Seberang Jaya Hospital recorded high BORs of over 100% in 2014 and 2015, before declining to below 85% in the following two years. However, its BOR spiked in 2018 to 96.3%, an indication that Seberang Jaya Hospital may have been struggling with bed shortages. Some patients could potentially be redistributed to Bukit Mertajam Hospital (which is located in the same district), which had a more optimal BOR of 72% in 2018. Sungai Bakap Hospital had the lowest rate of bed occupancy during the five-year period, with a low of 45.7% recorded in 2014.

Figure 3.45 Number of admissions and rate of admission per 1,000 population in hospitals by sector, Penang, 2014–18
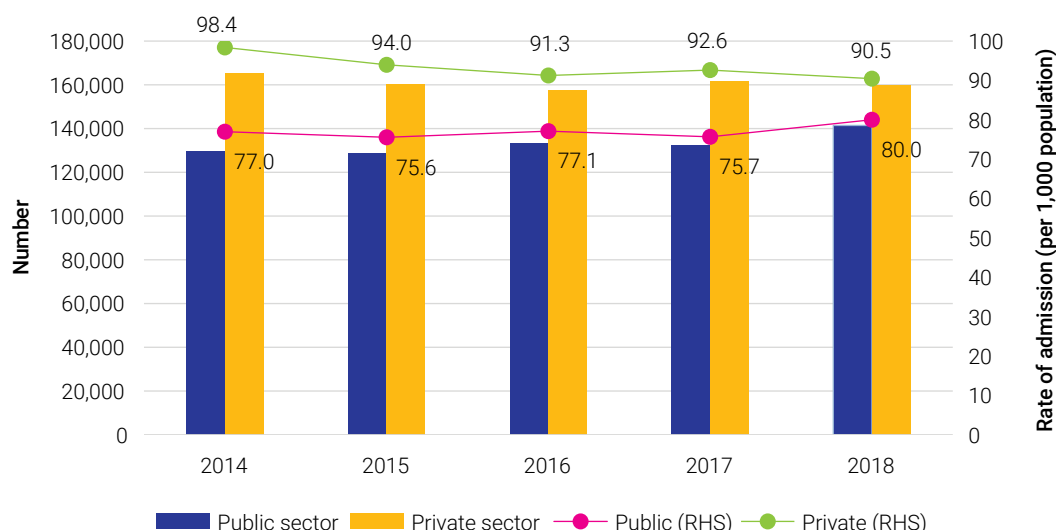
Source: Penang Institute estimates based on data from Health Indicators 2015–2019, Ministry of Health, Malaysia.

Figure 3.45 shows that there were more admissions into private hospitals compared with public hospitals. Private admissions accounted for 53.1% of total admissions in 2018—the lowest recorded over the five-year period. Both private and public health saw fluctuations in number of admissions. Naturally, the rate of admissions per 1,000 population followed the trend of total number of admissions. The highest rate of admissions for public hospitals (at 80 admissions) was seen in 2018, which also registered the lowest rate for private hospitals (at 91 admissions).

Figure 3.46 Number of outpatient visits and rate of attendance per 1,000 population in hospitals and clinics by sector, Penang, 2014–18
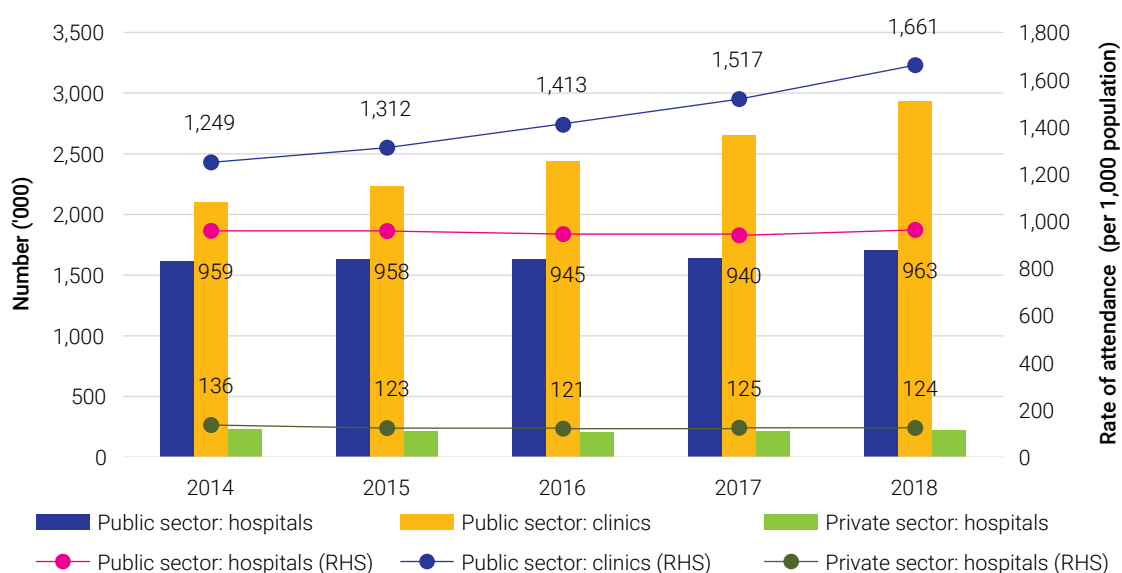
Source: Penang Institute estimates based on data from Health Indicators 2015–2019, Ministry of Health, Malaysia.

The reverse scenario is observed when it comes to outpatient visits, as the number of outpatient visits at public hospitals significantly exceeded private hospitals (Figure 3.46). In 2018, the share of private hospital visits was only about 4.5% of total hospital visits. However, public health clinics had the most outpatient visits, and the number of visits have been increasing at a much higher rate than public and private hospitals.

The 10.8% increase in outpatients in 2018 was the highest in five years. The rate of visits per 1,000 population for public and private hospitals remained constant, with negligible fluctuations. The rate of visits in public health clinics have continued to increase (along with total number of visits), peaking at 1,661 visits per 1,000 population in 2018.

Figure 3.47 Number of day care attendances and rate of attendance per 1,000 population in public hospitals, Penang, 2014−18
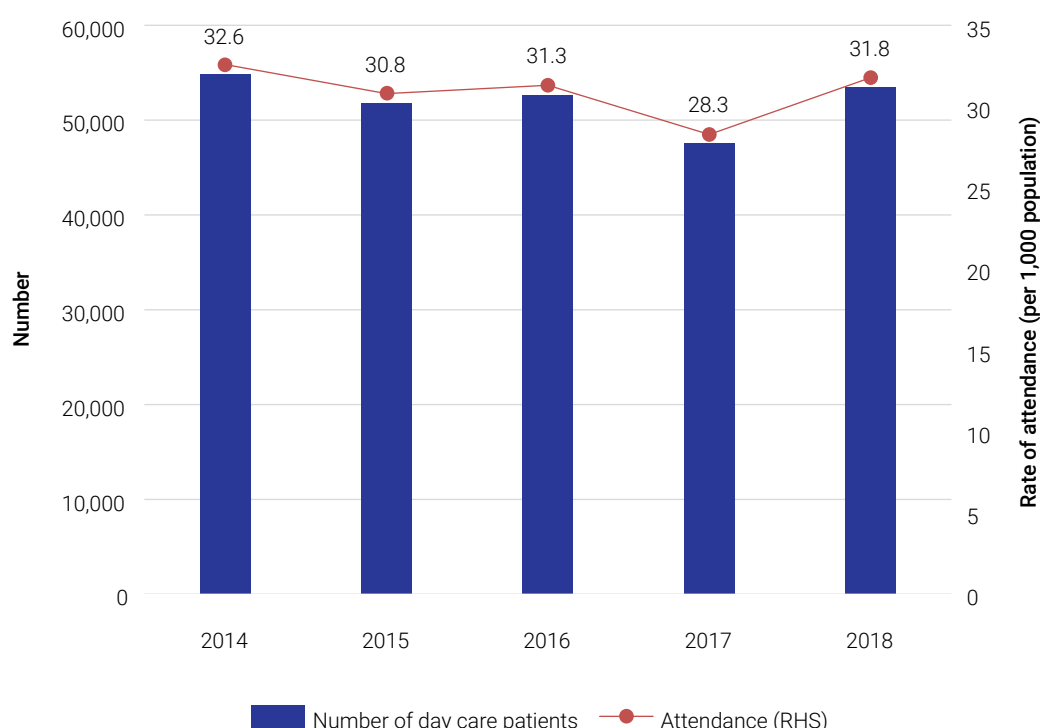
Note: Data for day care attendances at private health facilities are not available.
Source: Penang Institute estimates based on data from Health Indicators 2015−2019, Ministry of Health, Malaysia.

Day cares at public hospitals saw the lowest number of attendances and rate of attendance per 1,000 population in 2017 (in a five-year period) (Figure 3.47). It then saw a 12.4% increase in 2018, where the number of attendances per 1,000 population rose from 28 attendances to 32. This number peaked in 2014, when there were 54,788 day care procedures with 33 attendances per 1,000 population.

As seen in Figure 3.48, the departments for general medicine and obstetrics and gynaecology (O&G) saw the most number of admissions for public hospitals. There were more admissions for obstetrics and gynaecology for 2014 and 2016, but admissions[39] for general medicine were greater for the remaining years.

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[39] This does not include the category "others", as this category encompasses numerous other departments.

Figure 3.48 Number of admissions and average length of stay (ALOS) in public hospitals, Penang, 2014–18
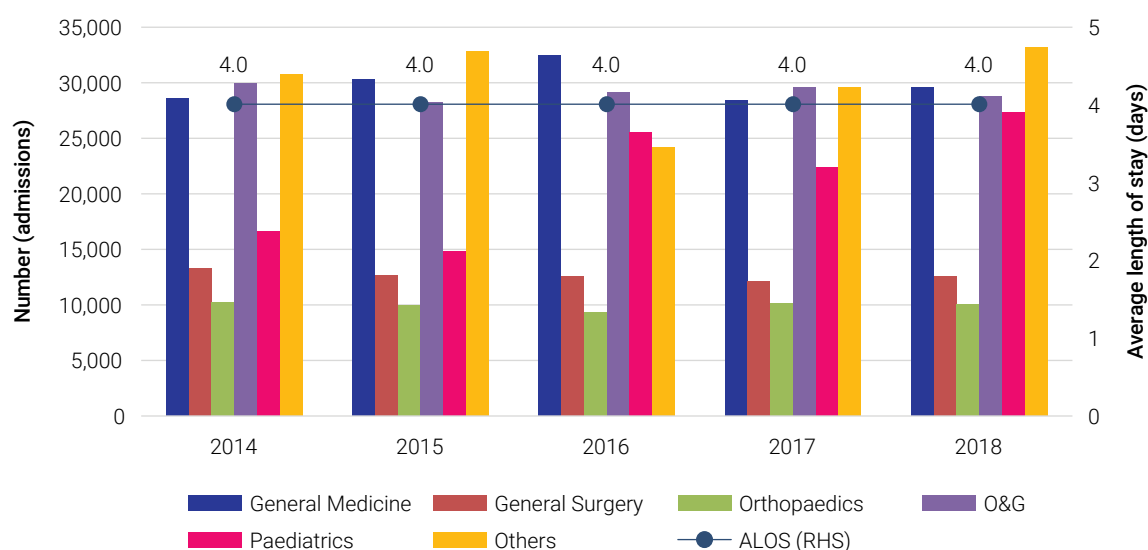
Source: Health Indicators 2015–2019, Ministry of Health, Malaysia.

The biggest increase in admissions can be seen in the paediatrics department, which had a 71.7% increase in 2016, then peaked in 2018. The average length of stay (ALOS) in all public hospitals remained constant from 2014 to 2018, with an average of four days per admission. However, looking at individual hospitals, it is found that the ALOS for all hospitals, with the exception of Penang General Hospital, was three days. The ALOS for Penang General Hospital was five days, and this held true during the five-year period[40].

Births and mortality rate

As per Table 3.37, Seberang Jaya had the highest number of births for 2017 and 2018, and this includes both live births and stillbirths. Sungai Bakap Hospital saw the lowest number of births. The total number of births decreased for all hospitals, with the exception of Kepala Batas Hospital, which recorded a 5.4% increase of 108 births in 2018. However, the hospital also saw an increase of 10 stillbirths; there were none in the previous year. Stillbirths accounted for 0.7% of all births in these six hospitals for both years.

Table 3.37 Number of live births and stillbirths in public hospitals, Penang, 2017–18

Hospital	Births					
	Live		Stillbirth		Total	
	2017	2018	2017	2018	2017	2018
Penang General Hospital	4,592	4,418	38	39	4,630	4,457
Seberang Jaya Hospital	5,829	5,688	61	44	5,890	5,732
Bukit Mertajam Hospital	1,561	1,297	2	8	1,563	1,305
Kepala Batas Hospital	2,013	2,111	0	10	2,013	2,121
Sungai Bakap Hospital	183	123	0	1	183	124
Balik Pulau Hospital	230	203	0	0	230	203
Total	**14,408**	**13,840**	**101**	**102**	**14,509**	**13,942**

Source: Annual Health Report 2018, Penang State Health Department.

[40] Data obtained from Health Facts, published by the Penang State Health Department.

Figure 3.49 Maternal mortality rate per 100,000 births in Penang, 2014–18
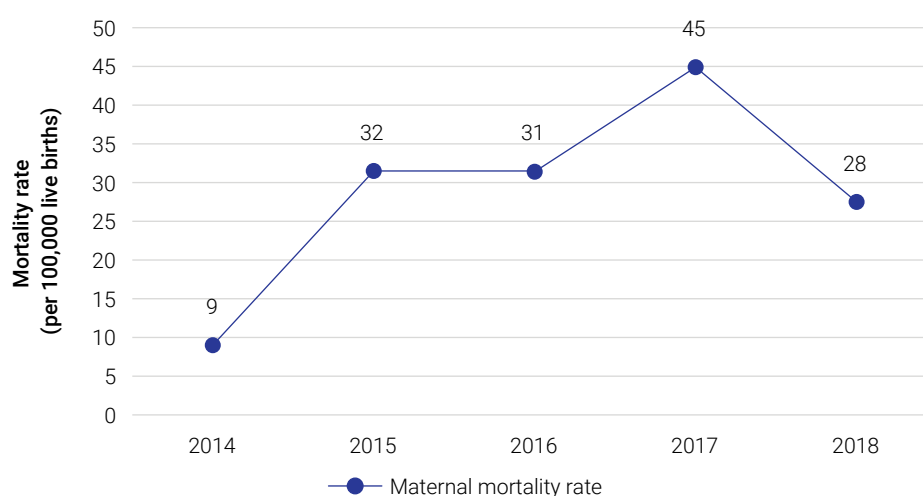
Source: Annual Health Report 2018, Penang State Health Department.

Maternal mortality rate was the lowest in 2014, when there were 9 deaths per 100,000 live births. However, this increased by 255.6% to 32 deaths per 100,000 live births in the following year. It then peaked at 45 deaths in 2017, before seeing a 37.8% decrease to 28 maternal deaths in 2018. It is unclear as to what caused the spike in maternal deaths from 2014 onwards.

Figure 3.50 Infant and child mortality rate per 1,000 births in Penang, 2014–18
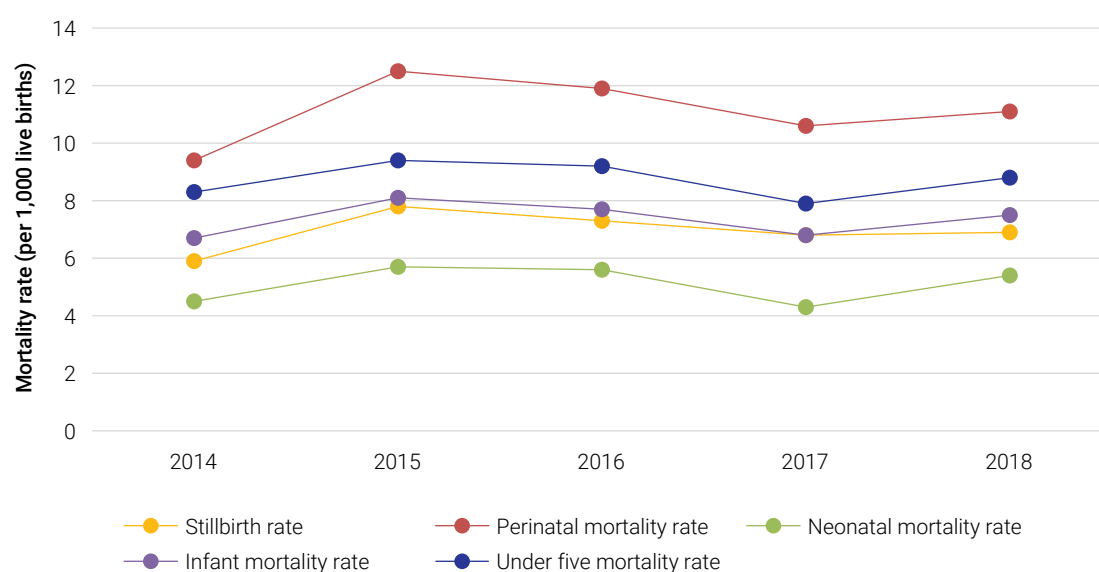
Source: Annual Health Report 2018, Penang State Health Department.

Figure 3.50 shows that neonatal mortality rates are generally the lowest when measured against other infant and child mortality rates. Neonates refer to infants in the first 28 days after birth and is generally considered to be the most vulnerable period for a child (UNICEF, 2019). The neonatal mortality rate was the highest in 2015 and 2016, with six deaths per 1,000 live births, before decreasing in 2017, and then increasing to five deaths in 2018.

The highest number of deaths is seen among the perinatal infants. The perinatal period is considered to begin after 22 weeks (154 days) of gestation and ends seven days after birth. Perinatal mortality rate refers to the number of deaths within seven days of birth. The number of perinatal deaths per 1,000 live births peaked in 2014 with 13 deaths, before decreasing to 11 in 2017; the rate held steady in 2018. As for stillbirths, the rate remained constant over the three-year period, with three stillbirths per 1,000 live births.

Disease

According to Table 3.38, dengue fever is generally the communicable disease with the most cases within the five-year period. The only exception was in 2016, when hand, foot, and mouth disease cases outnumbered dengue fever. Both diseases saw significant spikes from 2017 to 2018, with dengue fever cases seeing an increase of 127.1% (3,388 cases)—a five-year high.

Table 3.38 Number of major communicable diseases by cases, Penang, 2014–18

Disease	2014	2015	2016	2017	2018
Dengue fever	3,096	5,790	2,562	2,664	6,052
Hand, foot, and mouth disease	1,450	758	3,019	1,553	5,248
Tuberculosis	1,347	1,415	1,523	1,501	1,379
Food poisoning	2,227	434	609	872	1,158
HIV	110	104	81	195	237
Syphilis	59	68	66	85	175
Leptospirosis	195	144	44	82	96
Hepatitis C	22	50	51	46	77

Source: Annual Health Report 2018, Penang State Health Department.

Hand, foot, and mouth cases rose from 1,553 in 2017 to 5,248 in 2018, an increase of 237.9%. Other major communicable diseases also recorded spikes in the two-year period, with the exception of tuberculosis, which saw a drop of 122 cases (0.81%).

Another communicable disease that saw significant fluctuations is food poisoning, which had a decrease of 1,793 incidences (80.1%) in 2015, and it remained in the hundreds until 2018, which saw a 32.8% increase.

Figure 3.51 Prevalence rate per 100,000 population of top-five major communicable diseases in Penang, 2014–18
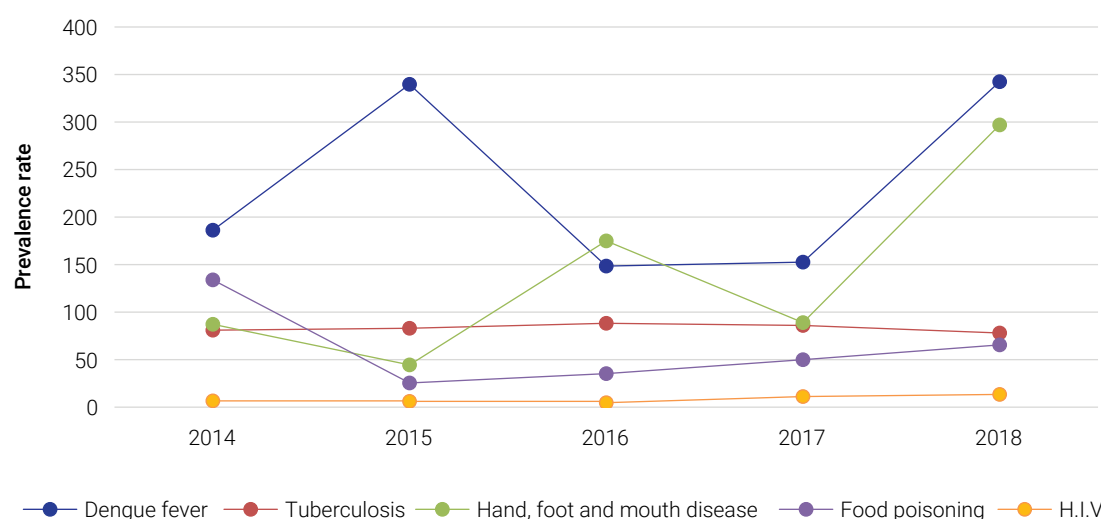
Source: Penang Institute estimates based on data from Annual Health Report 2018, Penang State Health Department.

Figure 3.51 shows that the prevalence rate for dengue cases was the highest in 2015 and 2018 (coinciding with the total number of cases) at 340 and 342 cases, respectively (per 100,000 population). The prevalence rate for hand, foot, and mouth disease peaked in 2018 at 297 cases per 100,000 population. The prevalence rate for the other major communicable diseases were significantly lower and considerably less volatile, with HIV being the lowest at 13 incidences per 100,000 population.

Box 3.5 COVID-19 in Malaysia and Penang

By Yeong Pey Jung

COVID-19 is an infectious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Common symptoms include fever, cough, shortness of breath, sore throat, and aches and pains (World Health Organisation, 2020). The spread of the virus is caused by droplets in the air produced by sneezing, coughing, and/or talking, and the virus can survive on a contaminated surface for as long as 72 hours. The incubation period for the virus is up to 14 days, although some patients may show symptoms within five days (World Health Organisation, 2020).

In Malaysia, the Ministry of Health has precise guidelines in detecting, testing, and treating COVID-19 cases. Certain public hospitals are selected to become screening hospitals, and there is typically one public hospital in each state responsible for treating positive cases. Testing is available in some private hospitals, but all positive cases must be referred to the designated public hospital for treatment.

In Penang, the four screening hospitals are Penang General Hospital, Seberang Jaya Hospital, Bukit Mertajam Hospital, and Kepala Batas Hospital, with Penang General Hospital acting as the admitting hospital for persons under investigation (PUIs) as well as positive cases. There are also five health clinics (Klinik Kesihatan) where screening is accessible: Jalan Perak health clinic, Bayan Baru health clinic, Sungai Dua health clinic, Seberang Jaya health clinic, and Bukit Panchor health clinic[41].

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[41] *List of screening hospitals and health clinics retrieved are as published by the Ministry of Health, retrieved from http://www.moh.gov.my/moh/resources/Penerbitan/Garis%20Panduan/COVID19/Annex_3_Screening_centre_24032020.pdf*

Table 3.39 Number and percentage of COVID-19 cases and deaths by state, Malaysia, 23 July 2020

State	Number of cases	Percentage	Number of deaths	Percentage
Johor	718	8.1%	21	17.1%
Kedah	100	1.1%	1	0.8%
Kelantan	159	1.8%	3	2.4%
Malacca	258	2.9%	5	4.1%
Negeri Sembilan	1,028	11.6%	8	6.5%
Pahang	366	4.1%	7	5.7%
Penang	**121**	**1.4%**	**1**	**0.8%**
Perak	261	3.0%	6	4.9%
Perlis	18	0.2%	2	1.6%
Selangor	2,112	23.9%	24	19.5%
Terengganu	114	1.3%	1	0.8%
Sabah	384	4.3%	7	5.7%
Sarawak	632	7.1%	18	14.6%
*Kuala Lumpur	2,454	27.8%	18	14.6%
*Labuan	17	0.2%	0	0.0%
*Putrajaya	98	1.1%	1	0.8%
Total	**8,840**	**100.0%**	**123**	**100.0%**

* denotes Federal Territories
Source: Penang Institute estimates based on data from the Ministry of Health, Malaysia.

At the time of writing[42], Malaysia has a total of 8,840 cases, with the highest number of cases found in Kuala Lumpur, which accounts for 27.8% of cases (Table 3.39). Selangor is second with 2,112 cases, or 23.9% of total cases. Penang is on the lower end of the spectrum with 121 cases (0.8%). The lowest number of cases can be found in Labuan (17 cases, 0.2%) and Perlis (18 cases, 0.2%).

With 123 deaths, Malaysia's COVID-19 fatality rate stands at 1.4%. Selangor has the highest number of deaths at 24 cases thus far, followed by Johor with 21 deaths. Sarawak and Kuala Lumpur are tied for third with 18 deaths each. These three states and federal territory have accounted for 65.2% of COVID-19-related deaths in Malaysia. All other states and federal territories have registered fewer than 10 deaths each. Only one death has been recorded in Penang.

Figure 3.52 Number and percentage of COVID-19 cases by district, Penang, 2020
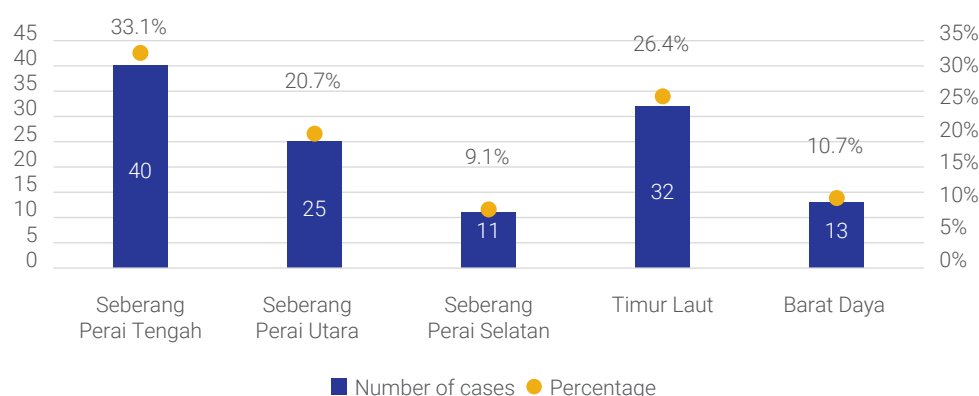
Source: Penang Institute estimates based on data from the Ministry of Health, Malaysia.

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[42] All COVID-19 cases and deaths are as of 23 July 2020.

With 40 cases, Seberang Perai Tengah has the highest number of cases, followed by Timur Laut with 32 cases or 26.4% of overall cases in the state. These two districts account for more than half the cases in Penang. The fewest number of cases is found in Seberang Perai Selatan (11 cases).
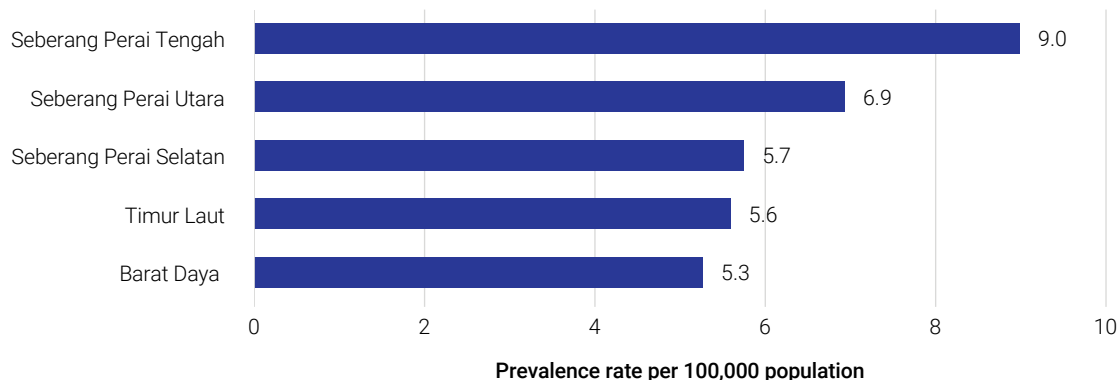
Figure 3.53 Prevalence rate per 100,000 population[43] for COVID-19 by state, Malaysia, 2020

Number (Prevalence rate)
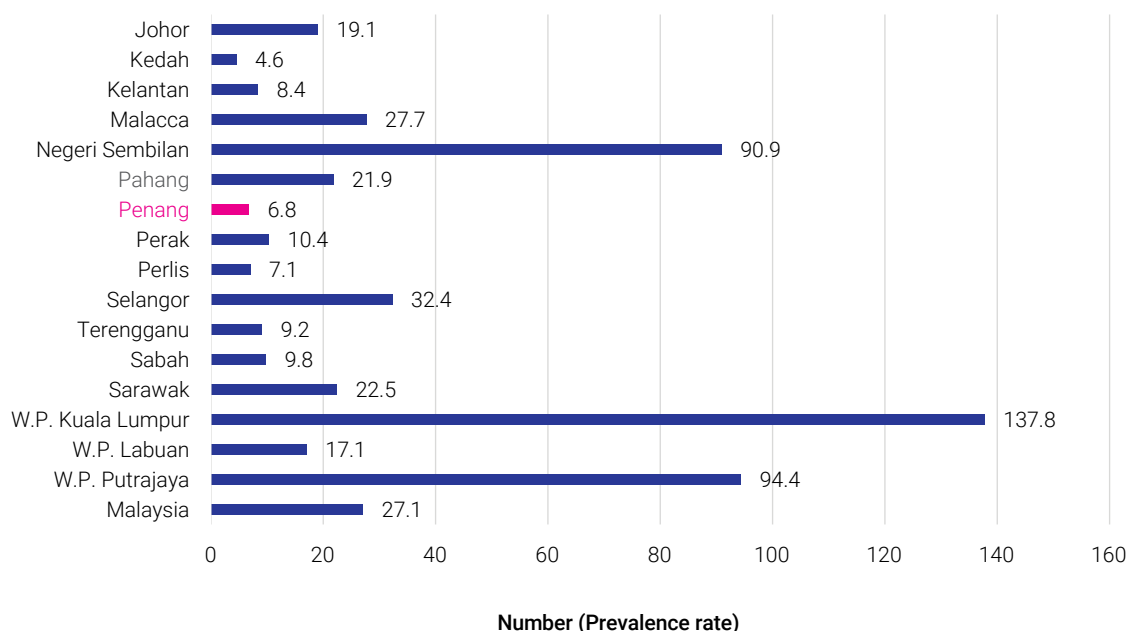
Source: Penang Institute estimates based on data from Ministry of Health, Malaysia.

The prevalence rate for COVID-19 is the highest in Kuala Lumpur, where 137 cases have been recorded per 100,000 population. Putrajaya is second with 94 cases. Despite having the greatest number of positive cases, Selangor's prevalence rate is 32 cases per 100,000 population, owing to the state's status as Malaysia's most populous state. The prevalence rate for Penang is seven cases per 100,000 population. The lowest prevalence rate belongs to Kedah with five cases.

Figure 3.54 Prevalence rate per 100,000 population[44] for COVID-19 by district, Penang, 2020

Prevalence rate per 100,000 population

Source: Penang Institute estimates based on data from the Ministry of Health, Malaysia.

In Penang, Seberang Perai Tengah is the district with the highest prevalence rate at nine cases per 100,000 population (Figure 3.54). Timur Laut, the state's most highly and densely populated state, has a lower prevalence rate of six cases. The prevalence rate is the lowest in Barat Daya, where five cases have been recorded against a population of 100,000.

[43] Total population for 2019 is used for calculations, as it is the latest available population data.

[44] Total population for 2018 is used for calculations, as it is the latest available population data categorised by district.

Table 3.40 Principal causes of deaths by disease in all hospitals, Penang, 2018

Causes	Number of deaths	Percentage of total deaths
Diseases of the respiratory system	874	20.3%
Diseases of the circulatory system	866	20.1%
Certain infections and parasitic diseases	696	16.2%
Neoplasms	469	10.9%
Diseases of the genitourinary system	277	6.4%
Endocrine, nutritional, and metabolic diseases	252	5.9%
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified	248	5.8%
Diseases of the digestive system	184	4.3%
Diseases of the nervous system	82	1.9%
Diseases of the skin and subcutaneous tissue	80	1.9%
Subtotal	4,028	93.7%
Total deaths	**4,301**	**100%**

Source: Ministry of Health, Malaysia.

In 2018, the biggest cause of death in Penang was respiratory diseases (Table 3.40), which accounted for 20.3% of overall deaths. This includes asthma, acute pneumonia, and others. With 866 deaths, circulatory system diseases (hypertension, heart failure, stroke, and others) followed closely, accounting for 20.1% of total deaths. Diseases affecting the skin and subcutaneous tissue caused only 1.9% (80 cases) of total deaths.

Healthcare workforce

As illustrated by Figure 3.55, there are considerably more doctors working in the Penang public health sector. The ratio of doctors in public health to private was more than 2 to 1 in 2018—the highest in five years. Since 2016, the number of doctors in the public sector has been increasing at a much greater rate than the private sector, which registered increases of not more than 5.0%.

Figure 3.55 Total number of doctors by sector and ratio of doctors per 10,000 population, Penang, 2014–18
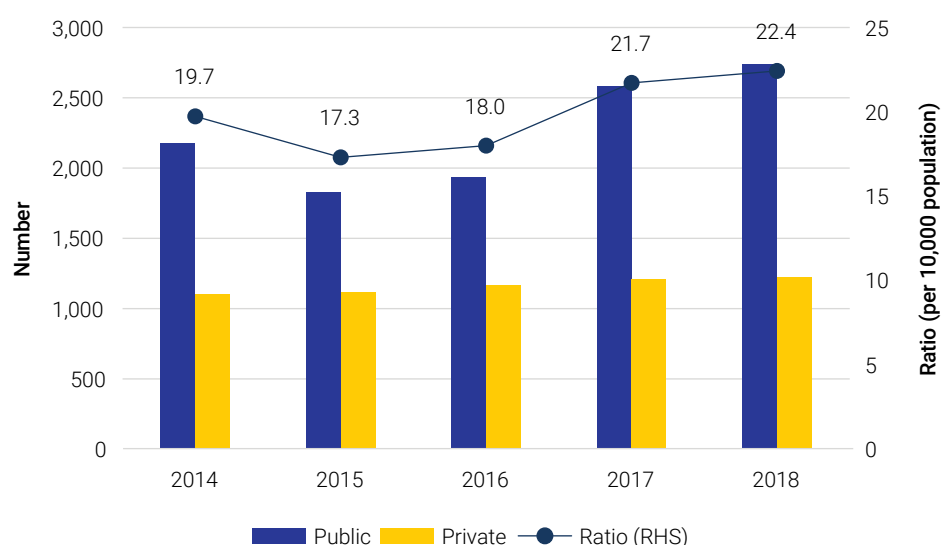
Source: Penang Institute estimates based on data from Health Indicators 2015–2019, Ministry of Health, Malaysia.

The number of doctors per 10,000 population[45] has been increasing since 2016, rising by 22.2% to 22 in 2018. It should be noted, however, that Malaysia currently faces an oversupply of medical graduates, and there are not enough placements at public hospitals for them to receive their training (Khor, 2019).

**Figure 3.56 Total number of nurses by sector and ratio of nurses per 10,000 population, Penang, 2014−18**
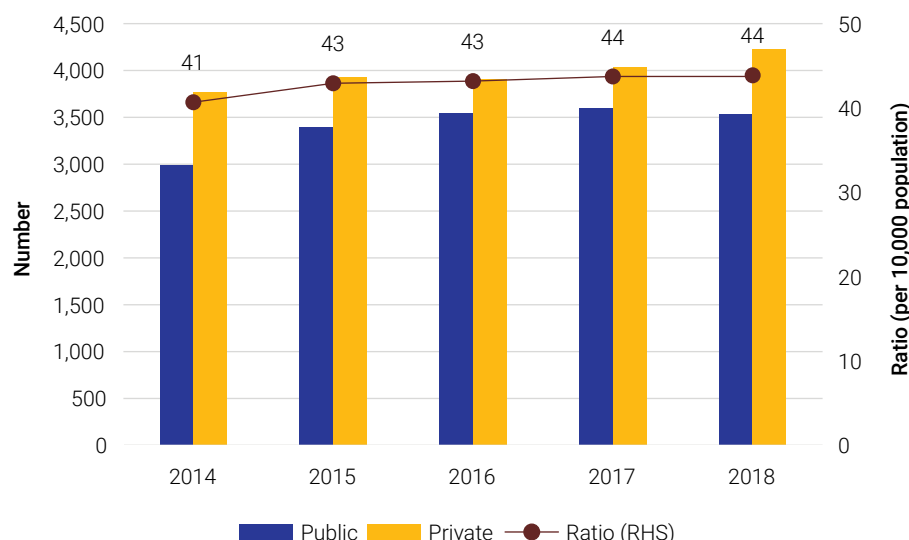
Source: Penang Institute estimates based on data from Health Indicators 2015−2019, Ministry of Health, Malaysia.

The number of nurses in the private sector exceeds those in the public sector, but at much smaller rates when compared with the public-private ratio for doctors (Figure 3.56). There were 19.8% more nurses in private health in 2018. The number of nurses in private health has been increasing since 2016, reaching 4,222 nurses in 2018, which was the highest in five years. Nurses in public health saw an upward trend, before registering a small drop in 2018. The number of nurses per 10,000 population have held steady over the period, and was at 44 nurses per 10,000 population in 2018.

There are more nurses in the health workforce versus doctors. In 2018, ratio of doctors to nurses in public health was 1:1.29. The ratio was much bigger when it came to the private sector, at more than three nurses to one doctor (1:3.46), due to the smaller number of doctors in private health.

Figure 3.57 Total number of pharmacists by sector and ratio of pharmacists per 10,000 population, Penang, 2014−18
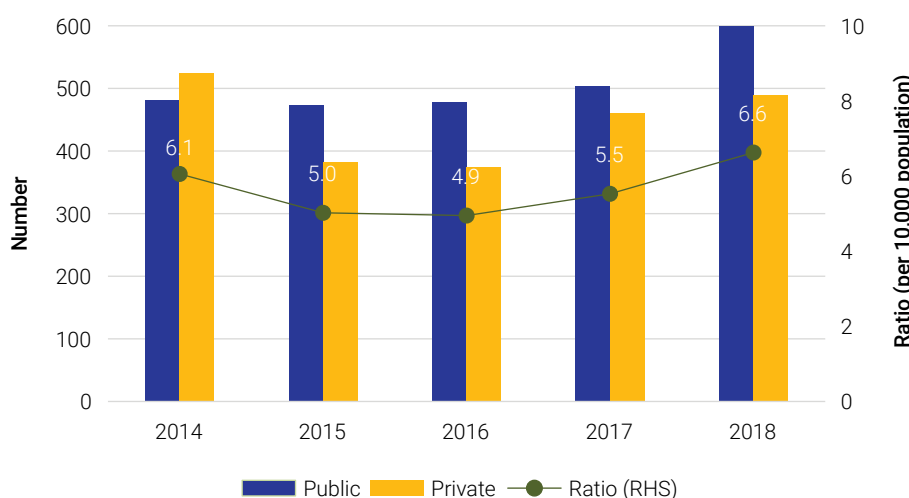
Source: Penang Institute estimates based on data from Health Indicators 2015−2019, Ministry of Health, Malaysia.

[45] The density of health workers per population is as defined by the World Health Organisation (WHO), retrieved from https://www.who.int/data/gho/indicator-metadata-registry/imr-details/3186

There are considerably fewer pharmacists and dentists in Penang's health workforce compared with doctors and nurses. Pharmacists in the public sector started to outnumber those in the private sector beginning in 2015. Pharmacists for both sectors have been increasing since 2016. The biggest increase in pharmacists in public health was 35.1% in 2018, while the highest increase for private health was 22.9%, in 2017. The number of pharmacists per 10,000 population have been trending upwards, increasing from five pharmacists to seven during 2016–18.

Figure 3.58 Total number of dentists by sector and ratio of dentists per 10,000 population, Penang, 2014–18
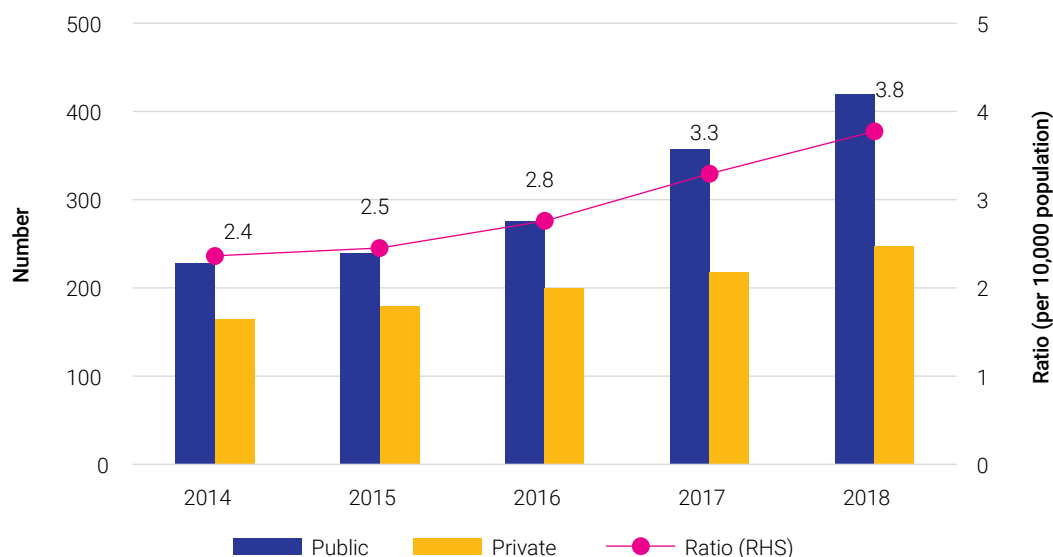
Source: Penang Institute estimates data from Health Indicators 2015–2019, Ministry of Health, Malaysia.

The number of dentists in both public and private health has been on the rise from 2014 to 2018. Public sector dentists have always exceeded those in the private sector. For instance, there were approximately 70% more dentists in public health in 2018. The number of dentists per 10,000 population has been increasing ever year, going from two dentists in 2014 to five in 2018.

3.3 Construction sector

The value of construction work done is an indicator used to assess the economic performance of the construction sector. It measures the value of completed work, namely new constructions, repairs, restorations, conversions, and maintenance works.

During the first three quarters of 2019, the total value of completed construction projects in Penang increased by 1.5% y-o-y to nearly RM5 billion (Figure 3.59), despite the fact that the construction sector's contribution to Penang's total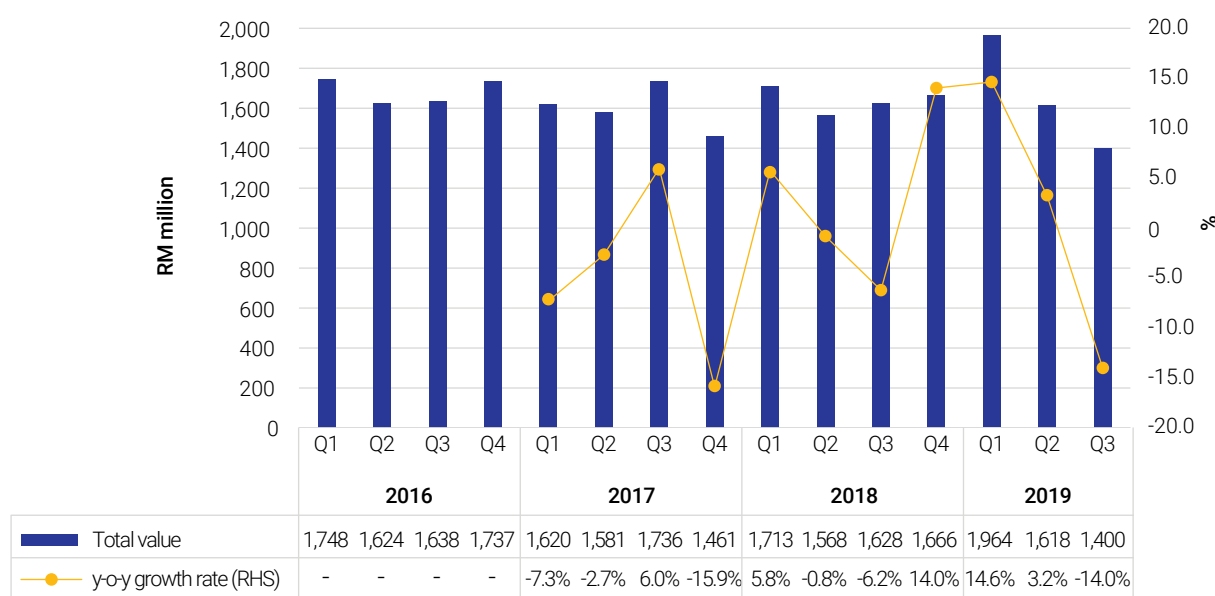 GDP decreased from almost RM3 billion in 2016 to RM2.6 billion in 2018. The sector's growth was mainly driven by residential and non-residential sub-sectors. Residential projects contributed 46.3% to the total value of construction work done, and grew by 3.9% y-o-y. Non-residential projects contributed 38.6% in value, and saw a growth rate of 3.4% (Figure 3.60).

Growth in house prices in Penang has showed a strong recovery amid overall dismal trends in Malaysia. In Q2 2019[46], the average HPI in Malaysia grew by less than 1%, its lowest rate since 2010. Most states experienced declining growth rates, except for Kelantan, Pahang, and Penang.

Penang's HPI stood at 195.2 in Q2 2019, with a y-o-y growth rate of 3.3% (Figure 3.61). The average house price in Penang was RM437,632 during Q2 2019, an increase of RM13,701 from the previous year.

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[46] The House Price Index (HPI) is based on the year 2010.

Figure 3.59 Total value of construction work done in Penang, Q1 2016–Q3 2019

		2016				2017				2018				2019		
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Total value		1,748	1,624	1,638	1,737	1,620	1,581	1,736	1,461	1,713	1,568	1,628	1,666	1,964	1,618	1,400
y-o-y growth rate (RHS)		-	-	-	-	-7.3%	-2.7%	6.0%	-15.9%	5.8%	-0.8%	-6.2%	14.0%	14.6%	3.2%	-14.0%

Source: Quarterly Construction Statistics, Department of Statistics, Malaysia.

Figure 3.60 Value of construction work done in Penang by sub-sector, Q1–Q3 2019
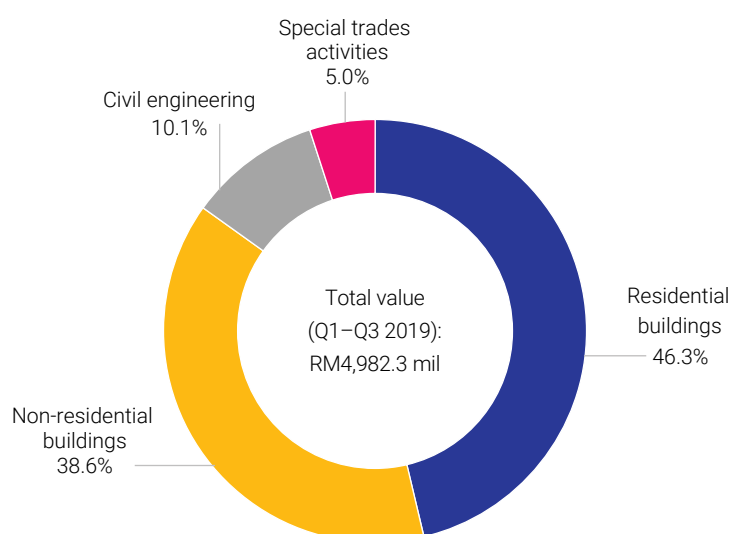
Source: Quarterly Construction Statistics, Department of Statistics, Malaysia.

All housing types in Q2 2019 experienced an increase in prices compared with the second quarter of 2018, except for the semi-detached segment which recorded a negative growth rate of 2.3%. In particular, high-rises and detached houses saw large growth rates of 5.7% and 5.4%, respectively, relative to other house types (Figure 3.62). On average, a high-rise unit was priced at RM342,130 in Q2 2019. The average price for detached houses was RM810,302,

according to the National Property Information Centre (NAPIC).

Terraced houses in Penang cost an average of RM483,997, but this was skewed by prices on Penang Island (RM927,614) where the average was triple those in Seberang Perai (RM322,482). However, prices on the mainland grew at a faster pace of 4.8% per year from Q2 2016 to Q2 2019 compared with 1.6% on the Island.

Figure 3.61 Year-on-year growth rate of HPI (2010 = 100) for selected states, Q1 2016–Q2 2019
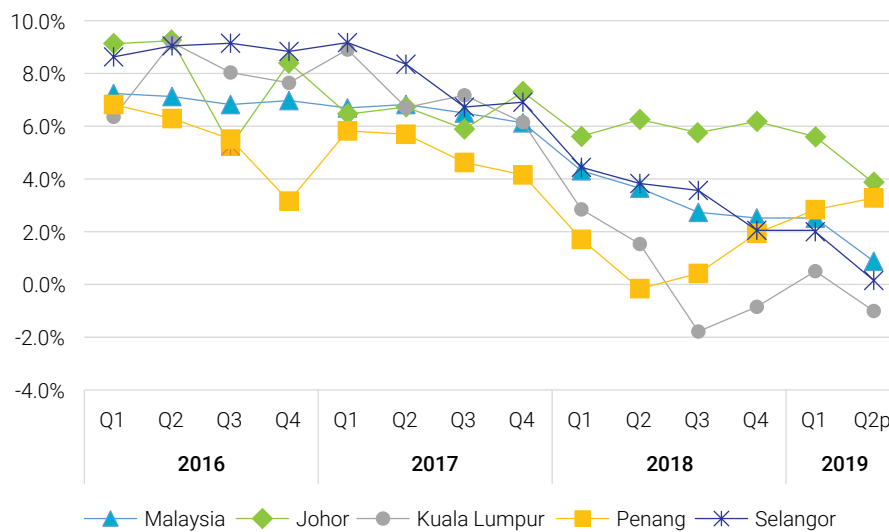
Note: p = preliminary
Source: Malaysian House Price Index, National Property Information Centre (NAPIC).

Figure 3.62 Year-on-year growth rate of HPI by residential property type, Q1 2016–Q2 2019
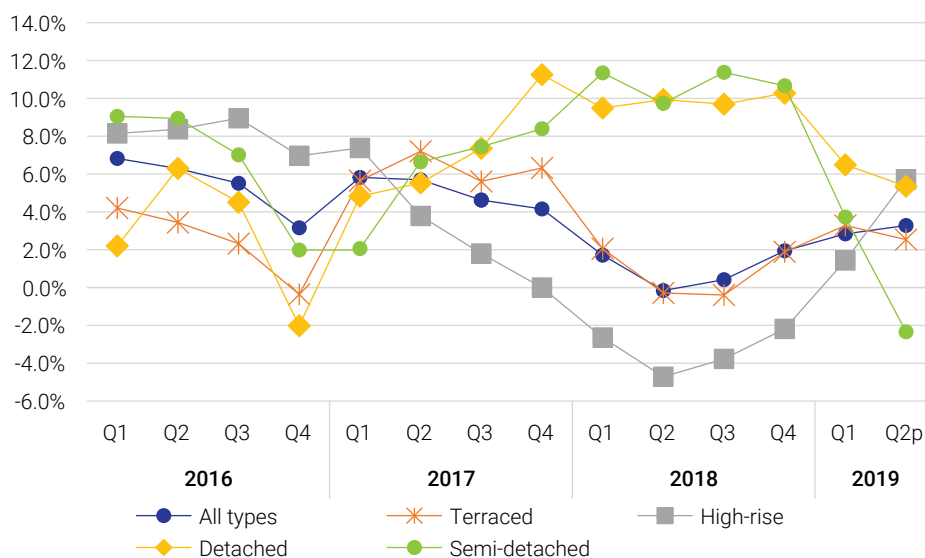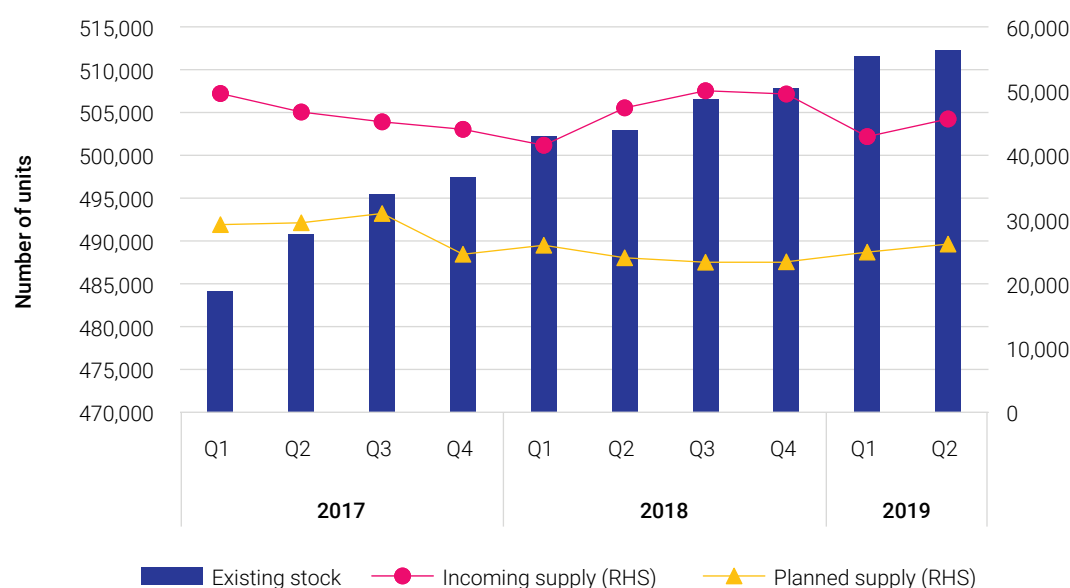

Note: p = preliminary
Source: National Property Information Centre (NAPIC).

Supply of residential property

Available residential stock in the market had been increasing gradually since 2017, as depicted in Figure 3.63. In the second quarter of 2019, cumulative stock increased by 1.9% y-o-y to 512,253. Timur Laut, as the most developed district, had the most houses. Total stock amounted to 176,137, with flats, condominiums, and apartments taking up the largest shares. This was followed by Seberang Perai Tengah (121,443), Seberang Perai Utara (84,846), Barat Daya (76,665), and Seberang Perai Selatan (53,162).

Figure 3.63 Number of residential existing stock, incoming supply and planned supply in Penang, Q1 2017–Q2 2019

Note: All the data presented are preliminary.
Source: National Property Information Centre (NAPIC).

Of the existing stock, 1,452 were new completions from H1 2019, where more than 70% were located in Seberang Perai Selatan and Seberang Perai Tengah. Condominiums and apartments accounted for about two-thirds of the total. Seberang Perai Selatan saw the largest y-o-y growth rate of 4% in Q2 2019, albeit from a small base. Single-storey terraced houses, condominiums, and apartments contributed the most to the growth.

By Q2 2019, 71,836 houses were expected to be added to Penang. This comprised incoming supply or units under construction (64%), and planned supply or units which were at different stages of planning.

Incoming supply increased by 6.4% quarter-on-quarter (q-o-q), even though it dropped by 3.6% on a y-o-y basis. Penang Island had a total of 28,197 on-going projects, split fairly equally between

Timur Laut (55%) and Barat Daya (45%), with condominiums and apartments accounting for more than two-thirds.

On the mainland, Seberang Perai Selatan, which saw the largest y-o-y growth in its housing stock in Q2 2019, is forecast to experience another strong increase relative to the other two districts. Seberang Perai Selatan accounted for 38% of upcoming residential properties, with two-to-three-storey terraced houses, condominiums and apartments, and two-to-three-storey semi-detached being the most popular types of properties built.

Looking at overall patterns of incoming supply on the mainland, housing supply will soon be dominated by condominiums and apartments. New landed housing developments have been on a downward trend since 2017[47] (Figure 3.64), being increasingly replaced by high-rise projects.

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[47] The large difference in the data of Q1 2017 from Q4 2016 is primarily due to the different calculation method by NAPIC (refer to the note of Figure 3.64). However, it still reflects that fact that the share of terraced houses is falling below that of condominiums and apartments.

Figure 3.64 Incoming supply of residential properties in Seberang Perai by type of houses, Q1 2015–Q2 2019
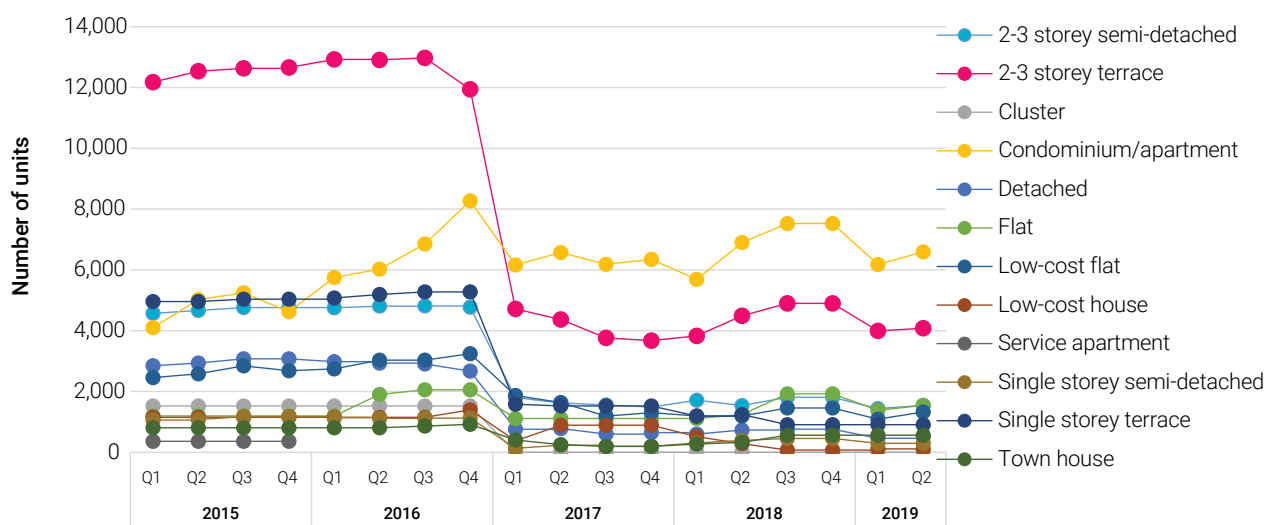
Note: Since Q1 2017, the number of incoming supply was adjusted to exclude data on projects that have since been completed and issued with Certificate of Completion and Compliance (CCC). Adjustments were also made to reflect the actual number of units built on-site (which differs from total units in the initial plan).
Source: Residential Property Stock Report, National Property Information Centre (NAPIC).

Planned supply has been on a moderate upward trend since Q3 2018 (Figure 3.63). Planned supply in Q2 2019 rose by 8.8% y-o-y to 26,178 units.

Almost 70% of the approved projects in Penang have been for Seberang Perai as of Q2 2019. However, planned housing was not uniformly distributed when broken down by type. Most of the projects approved for Penang Island were condominiums and apartments. Low-cost flats, condominiums, apartments, and two-to-three-storey terraced houses were the major building types approved for Seberang Perai.

Demand for residential property

Demand, especially for condominiums and apartments, is not as strong as supply. There is a clear oversupply from the rising number of overhang[48] residential properties. According to the National Property Information Centre (NAPIC), Penang recorded a total of 3,929 overhang units valued at RM3.26 billion in Q2 2019. While it is common to see high-end properties take up a large proportion of the list, it is rare for low to mid-range housing to remain vacant for more than nine months, since these are heavily promoted by developers and are considered affordable by Penang residents[49]. The NAPIC data for Q2 2019 showed that houses priced between

RM300,000 and RM400,000, as well as those below RM100,000, accounted for 569 (14%) and 413 (11%) unsold units, respectively, to Penang's overhang residential properties. Timur Laut had the most unsold units (39.6%), followed by Barat Daya (36%) and Seberang Perai Tengah (16%). More than two-thirds were condominiums and apartments, the majority of which were located in Timur Laut and Barat Daya.

In terms of sales performance, residential property continues to drive the sector. It accounted for 73% of the total transaction volume between Q1 and Q3 2019, peaking at 9,297 transactions—a marginal increase of 0.9% compared with January–September 2018. Homes valued at RM400,000–500,000 and RM150,000–250,000 contributed to the increase in transaction volume.

Despite overall rising transaction volume, the total transaction value saw a decline of 8.2% to RM3.68 billion. This is mainly because of the drop in transaction volume and value of condominiums and apartments, as well as vacant plots. In line with vigorous development on the mainland, the area saw growth in both transaction volume and value, especially in Seberang Perai Selatan. Meanwhile, the transaction volume is projected to decrease further in 2020 owing to weak demand for luxury and durable goods despite attractive financing packages, including

[48] Overhang property refers to a unit which remains unsold for more than nine months after completion.
[49] Based on the house price ranges of affordable houses (RMM) in Penang. There are five categories of RMM: RMM A (less than RM42,000), RMM B (less than RM72,500), RMM C1 (less than RM150,000), RMM C2 (less than RM200,000), and RMM C3 (less than RM300,000) (Source: Sistem Maklumat Perumahan Pulau Pinang). Previously, houses below RM400,000 were also included in the affordable housing scheme.

low lending rates, promotions, and rebates being rolled out. Box 3.6 explains the effects of the COVID-19 pandemic on the construction and real estate sectors.

The number of transactions gives a more nuanced picture of housing demand. The NAPIC data reveals that houses lying in the price ranges of RM500,001–1,000,000, RM50,001–150,000 and RM300,001–400,000 had the most transactions during January–September 2019. These price ranges coincide with those on the top of the list of overhang properties, suggesting that the "surplus" arose owing to non-price factors such as location or ancillary facilities. To build another 180,000 affordable housing units by 2030 (Bernama, 2020), the Penang state government should take this into consideration in order to avoid contributing to the stock of overhang units.

Box 3.6 The impact of COVID-19 on the construction sector

By Ng Kar Yong

The COVID-19 pandemic has impacted all economic sectors, including construction and real estate. Classified as non-essential businesses, all construction activities were not allowed to operate during the MCO, with the exception of critical and emergency repair works such as hill slope repairs, traffic management control, upgrading works at premises providing essential services, and emergency works, with prior approval from the Ministry of Works and the Ministry of International Trade and Industry (MITI) (Rajan et al., 2020).

During the MCO, 4,321 business establishments[50] and 62,000 persons[51] working in the Penang construction sector were affected, with nearly all construction and services related to construction works (97% and 99%, respectively) being small and medium enterprises[52]. Although some construction works have been allowed to operate during the third phase of the MCO, most construction services were only operating partially.

Job losses have also been prevalent. According to a survey carried out by the DOSM (2020b), 11.8% and 13% of employees in the construction and real estate sectors, respectively, reported job losses during the first phase of the MCO[53]. Another 15.6% and 7.9% in the respective sectors were asked to take unpaid leave. In terms of income loss, 45% of the workforce in the construction sector saw their incomes slashed by at least 50%, whereas 63% of the real estate workforce experienced a similar drop in income.

For the construction sector, on-going projects are expected to be delayed while the launch of new projects will likely be postponed in the short and medium term. Meanwhile, real estate businesses are brought to a standstill as consumers have been reluctant to spend on durable goods such as properties; some are adopting a "wait and see" approach in anticipation of a drop in prices.

As a result, there will be an increase in overhang properties, and house prices will moderate owing to the oversupply of residential and non-residential properties. In order to stimulate housing demand, several recovery measures such as the reintroduction of the Home Ownership Campaign (HOC), loosening financing entry criteria for third-home purchases, and exemption of stamp duty and the Real Property Gains Tax have been introduced (Kaur, 2020).

In the long run, the rental market will be significantly affected, particularly the non-residential segment. More retail spaces at shopping complexes and commercial units will be left unoccupied following the emergence of online shopping platforms during the MCOs (Foo, 2020). In the residential market, virtual showroom visits have been established by property developers and agents to entice potential house buyers through social media, along with lucrative promotions (Edge Property, 2020).

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[50] There were 2,888 construction and 1,433 real estate establishments in 2015 (the latest data available). (Department of Statistics Malaysia, 2017)

[51] In 2018, there were 56,700 and 5,300 employments in the construction and real estate industries, respectively. (Department of Statistics Malaysia, 2020a)

[52] Taken from Profile of Small and Medium Enterprises (Department of Statistics Malaysia, 2017).

[53] The survey was conducted online from 23 to 31 March 2020.

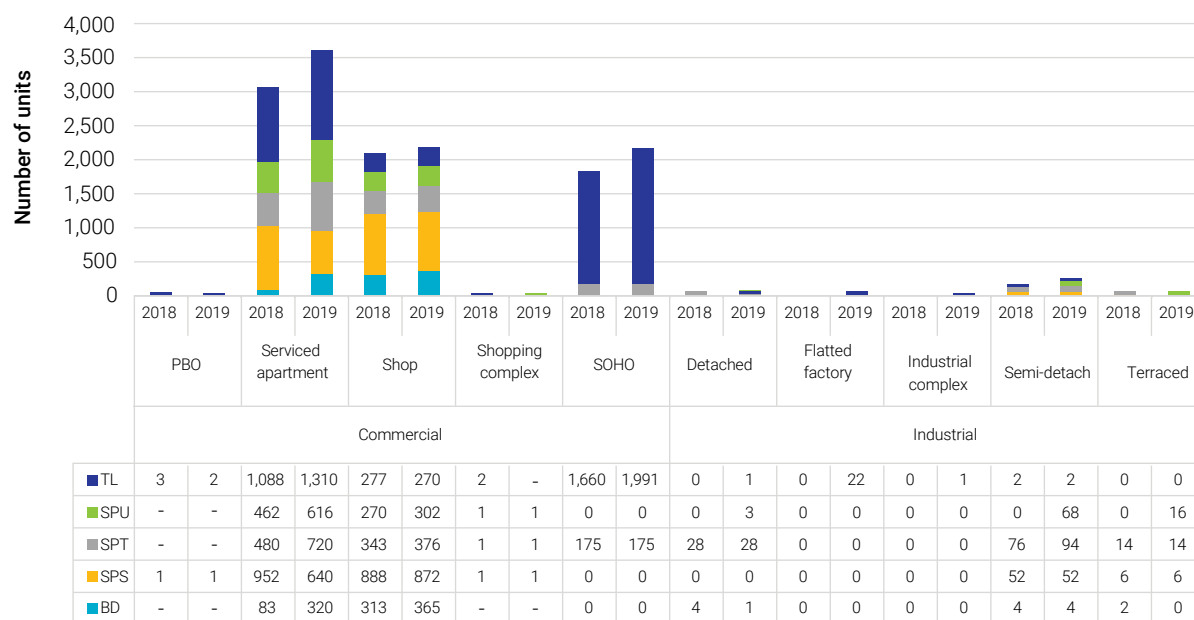## Expansion in non-residential properties

Compared with the first three quarters of 2018, the total value of completed construction work for non-residential properties between Q1 and Q3 2019 increased by 3.4% to RM1.92 billion (Figure 3.60).

Non-residential properties recorded 3,368 transactions valued at RM2.84 billion from January to September 2019. Transaction volume declined by 0.5% y-o-y, while transaction value declined by 18.4%. The transaction volume for commercial and industrial properties showed growth of 11.4% and 2.3%, respectively, while agriculture and development land fell by 6.6% and 4.9%, respectively. The significant decline in transaction value was primarily attributed to the drop in transaction value for development land priced above RM1 million. For commercial and industrial sectors, most of the transactions consisted of properties priced above RM500,000, constituting 45% and 61%, respectively. Agriculture properties were mostly transacted at the lower end of the price range — less than RM100,000.

By Q2 2019, the supply of non-residential properties had grown, mainly driven by commercial and industrial properties. The market saw a total of 43,526 commercial and 9,176 industrial units, up 3.5% and 0.2% from Q2 2018, respectively. Furthermore, the sector was anticipating an additional supply of 17,348 commercial units and 642 industrial units, mainly in Seberang Perai Tengah and Timur Laut.

In the commercial sector, Penang had only three purpose-built offices (PBO) under construction in Q2 2019: two privately owned buildings and one government-owned. Incoming shop units grew moderately at 4.5% y-o-y, reaching 2,185 units. Meanwhile, serviced apartments and small office-home offices (SOHO) saw the largest growth. The stock of serviced apartments increased by 17.7% and SOHOs by 18%, totalling 5,772 units (Figure 3.65). While most of the existing supply of these commercial units are concentrated in Timur Laut, Seberang Perai Selatan saw the largest increase: 312 newly completed units were built in the region in the first half of 2019.

Figure 3.65 Incoming supply of commercial and industrial properties in Penang by district, Q2 2018 and Q2 2019

	PBO 2018	PBO 2019	Serviced apartment 2018	Serviced apartment 2019	Shop 2018	Shop 2019	Shopping complex 2018	Shopping complex 2019	SOHO 2018	SOHO 2019	Detached 2018	Detached 2019	Flatted factory 2018	Flatted factory 2019	Industrial complex 2018	Industrial complex 2019	Semi-detach 2018	Semi-detach 2019	Terraced 2018	Terraced 2019
TL	3	2	1,088	1,310	277	270	2	–	1,660	1,991	0	1	0	22	0	1	2	2	0	0
SPU	–	–	462	616	270	302	1	1	0	0	0	3	0	0	0	0	0	68	0	16
SPT	–	–	480	720	343	376	1	1	175	175	28	28	0	0	0	0	76	94	14	14
SPS	1	1	952	640	888	872	1	1	0	0	0	0	0	0	0	0	52	52	6	6
BD	–	–	83	320	313	365	–	–	0	0	4	1	0	0	0	0	4	4	2	0

Source: Commercial Property Stock Table and Industrial Property Stock Table, National Property Information Centre (NAPIC).

Penang recorded 1,061 transactions for commercial properties in the first three quarters of 2019. Almost two-thirds of these were concentrated in Seberang Perai Tengah (29.4%) and Timur Laut (29.3%). Barat Daya saw the largest increase in transaction share, representing 14.0% of transactions compared with 9.6% in 2018. This is a y-o-y growth rate of 64% in transaction volume, most of which were shop or retail lots, hotels, and serviced apartments.

Timur Laut continued to record the highest transaction value, at RM388.3 million. In the first three quarters of 2019, the district accounted for almost 40% of total transaction value. However, Timur Laut was also the only district to see a drop in transaction value, at -8.5%, while all other districts recorded growth. The largest growth was seen in Seberang Perai Selatan, a four-fold increase from RM46.5 million (January–September 2018) to RM203 million (January–September 2019). Double-storey shops were the most popular properties, registering 357 transactions (33.7%) valued at RM200 million. This was followed by shop or retail units (24.4%) and three-storey shops (11.5%).

Incoming supply of industrial properties rose by 66% to 312 units in Q2 2019. Most of the units were located in Seberang Perai. Semi-detached remained the most favoured building type, accounting for about 70%, followed by terraced (11.5%) and detached (10.6%). About 75% of approvals were also issued to semi-detached industrial units, but demand for terraced units was higher compared with semi-detached. Despite having the second-fewest transactions, Barat Daya recorded the second-highest transacted value of RM230.7 million (35.4%) between Q1 and Q3 2019 owing to large, lumpy transactions, trailing Seberang Perai Tengah. Factories made up 67% of total sales value in the district.

Demand for commercial units have kept pace with increasing supply. The second quarter of 2019 saw the sales performance of commercial units improve y-o-y. Out of 911 launched commercial units, only about 17% or 158 units were unsold (Q2 2018: 40.6%)—over 60% of which were serviced apartments mostly situated in Barat Daya. On the other hand, demand for industrial properties on the mainland remained weak; 45.6% of 204 units launched, worth RM151.84 million, were unsold (Q2 2018: 46.6%). All unsold units were located in Seberang Perai Tengah and Seberang Perai Selatan.

In terms of take-up rate for privately owned PBOs, 78% of existing space (831,790 square meters) in Penang was occupied as of Q2 2019, slightly above

Figure 3.66 Occupancy rate of purpose-built offices (PBO) and shopping complexes (retail space) by state, Q2 2019

State	PBO	Retail
Pahang	82.5%	66.5%
Terengganu	93.1%	70.0%
Malacca	69.3%	70.2%
Negeri Sembilan	79.3%	72.2%
Penang	78.0%	72.3%
Kedah	76.1%	77.0%
Johor	68.4%	77.7%
Malaysia	76.9%	79.7%
Putrajaya	38.1%	80.2%
Sarawak	87.7%	80.8%
Sabah	82.5%	80.9%
Selangor	73.1%	83.1%
Kuala Lumpur	79.2%	83.4%
Perak	89.0%	84.1%
Kelantan	93.9%	91.4%
Labuan	80.0%	95.7%
Perlis	100%	100%
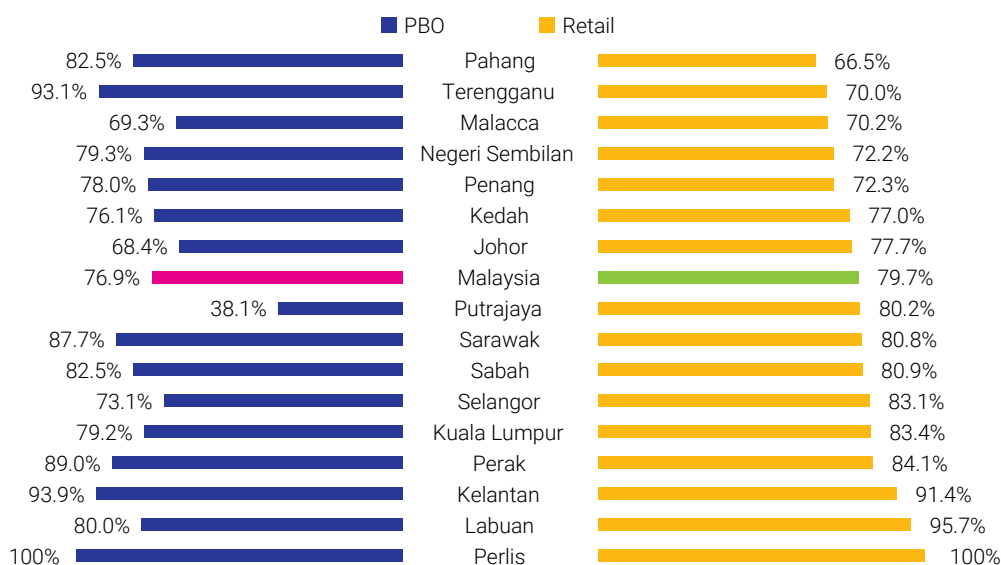
Source: Commercial Buildings: Occupancy and Space Availability Report, National Property Information Centre (NAPIC).

the national rate of 76.9% (Figure 3.66). Prime areas such as George Town, Bayan Baru, Sungai Nibong, and Gelugor saw high occupancy rates of more than 80%, while Bukit Mertajam, where four out of seven buildings had vacancy rates exceeding 50%, had the lowest rate of 43.3%.

As for retail space in shopping complexes, Penang had a lower occupancy rate of 72.3% in Q2 2019 compared with other major cities such as Kuala Lumpur (83.4%), Selangor (83.1%), Putrajaya (80.2%), and Johor (77.7%). The state's take-up rate was higher than Negeri Sembilan, Malacca, Terengganu, and Pahang (Figure 3.66). The remaining 482,690 square

metres of vacant retail space were from 73 shopping complexes, mostly concentrated in Bukit Mertajam.

George Town had the highest occupancy rate of 82.9%, reflecting strong demand. Rental prices of PBOs in this area continued to see stable y-o-y growth of 3.4% in the second quarter of 2019, higher than the growth of prices in Klang Valley and Johor Bahru.

Nevertheless, George Town still enjoyed low rental prices relative to Klang Valley and Johor Bahru. As of Q2 2019, the average rental rate in Penang was RM31.55 per square metre (psm) (Klang Valley: RM48.48 psm, Johor Bahru: RM34.19 psm) (Figure 3.67).

Figure 3.67 Average rental price and y-o-y growth rate of the rental index for major cities in Malaysia, Q1 2017–Q2 2019
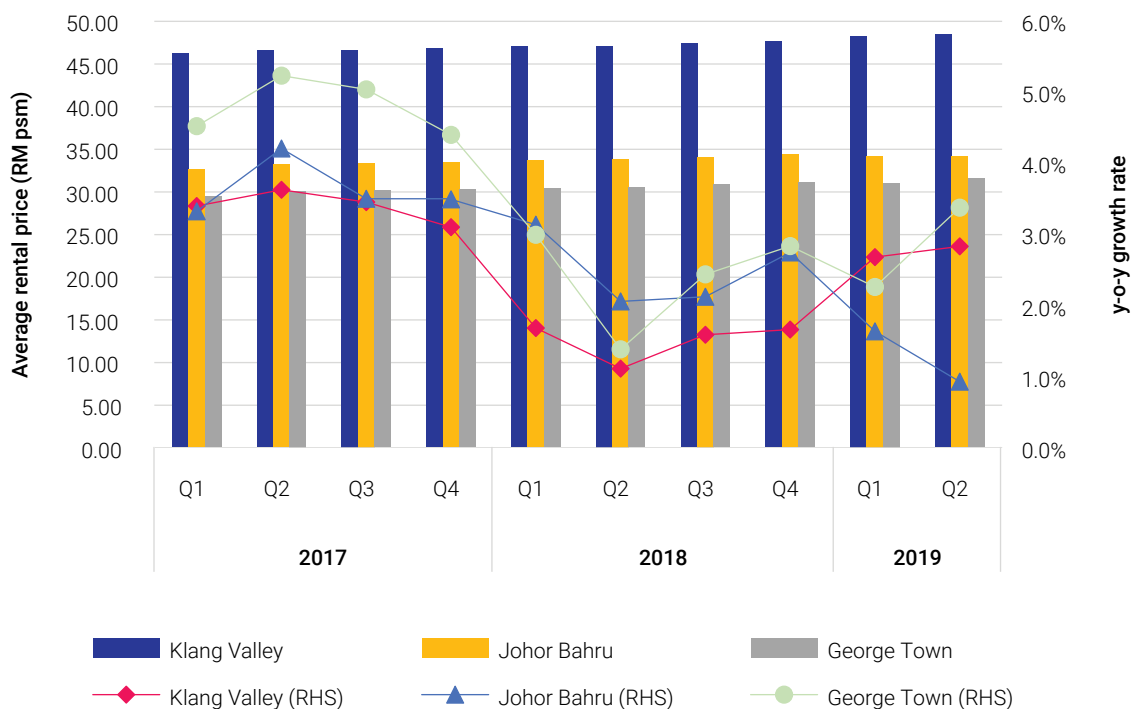
Source: Purpose-built Office Rental Index (PBO-RI), National Property Information Centre (NAPIC).

3.4 Agriculture and fishery sector

The Malaysian agricultural sector has not grown in tandem with the non-agriculture sector, as the value-add and productivity in this sector is far below the industrial sector. Although the agriculture sector contributes very little to Penang's GDP (2.2%), it offers a degree of food security and provides raw materials for resource-based industries. Furthermore, sustainable agriculture contributes a set of environmental goods and services such as cleaner air and water, as well as fostering wildlife habitat diversity.

3.4.1 Crops sub-sector

The total crop land use in Penang has dropped from 19,569.3 ha in 2014 to 17,946.4 ha in 2018, mainly owing to a significant decrease in coconut and fruits land use (Table 3.41). The majority of croplands are located in Seberang Perai Utara (51%) followed by Seberang Perai Tengah (20%), while only 1.5% are in Timur Laut (Table 3.42). Seberang Perai Utara (46%) and Seberang Perai Tengah (21%) have the most farmers in Penang (Table 3.42).

Table 3.41 Agricultural land use by crops (hectare), Penang, 2014–18

Crops	2014	2015	2016	2017	2018
Paddy	12,782.0	12,782.0	12,782.0	12,782.0	12,782.0
Fruits	5,298.1	4,816.1	4,715.7	5,570.0	3,660.1
Coconut	493.5	343.9	329.1	278.7	286.5
Cocoa	2.2	2.0	0.0	0.0	N/A
Vegetables	690.6	712.3	715.4	869.4	851.2
Cash crops	149.6	114.6	176.0	211.6	212.6
Spice crops	97.0	136.2	138.3	159.9	154.0
Sugar cane	45.0	44.6	42.9	42.6	N/A
Others	11.5	9.0	1.0	4.0	N/A
Total	**19,569.3**	**18,960.8**	**18,900.4**	**19,918.2**	**17,946.4**

Note: N/A=Not available.
Land use data for rubber and oil palm is not available.
Source: Department of Agriculture, Penang.

Table 3.42 Croplands and number of farmers by district, Penang, 2017

District	Area (km²)	Crops area (ha)	No. of farmers
Timur Laut	119	268.8	403
Barat Daya	173	2,309.3	1,875
Seberang Perai Utara	272	9,034.8	6,521
Seberang Perai Tengah	236	3,563.7	2,959
Seberang Perai Selatan	241	2,617.1	2,419

Source: Department of Agriculture, Penang.

The rice industry

The rice industry in Malaysia has received special attention from the government, as rice is a staple food of the country. It is in fact considered a strategic industry and an important sector of the economy. Land utilisation for paddy production is currently at about 12,782 hectares—about 70% of total agricultural (crop sub-sector) land use[54] in the state. There are about 7,057 paddy farmers, mostly concentrated in Seberang Perai Utara (Mok, 2016).

In 2017, Penang produced 146,660 metric tons of paddy, up from 145,580 metric tons in 2010 (Figure 3.68). Rice production grew on average by about 1.3% from 2010 to 2017. In 2017, rice production in Penang dropped by about 1.1% compared with 2016, mainly as a result of the November 2017 flash floods.

However, its rice yield was the highest in the country in the same year (Table 3.43). Self-Sufficiency Level (SSL) plays an important role when it comes to food security issues. Based on the national rice per capita consumption (PCC) of about 74.4 kg/year (Department of Statistics Malaysia, 2018b) and Penang's total population of 1.7 million, rice demand in Penang in 2017 were estimated at 129,954.5 metric tons. With a total rice production of 95,329 metric tons[55] in 2017, Penang's rice SSL was calculated to be about 73%; the remainder had to be imported to fulfil market demand. With the increase in per capita income and changes in consumption patterns and lifestyle, the percentage share of the total caloric supply from rice has significantly declined (Khazanah Research Institute, 2019). However, rice remains the main source of carbohydrates in Malaysia and its consumption is expected to increase further.

Figure 3.68 Paddy production in Penang, 2010−17
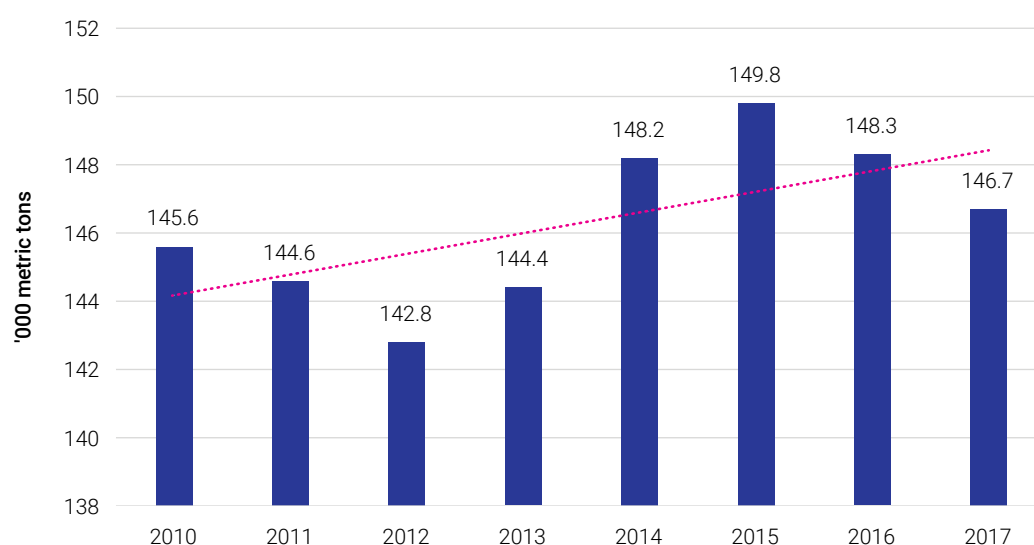
Source: Department of Agriculture, Penang.

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[54] Rubber and oil palm are not included.
[55] Assuming a paddy to rice conversion rate of 65%.

Table 3.43 Planted area, average yield and paddy production by state, 2017

State	Planted area (ha)	Average yield (kg/ha)	Paddy production (metric tonne)
Johor	3,000	2,854	8,563
Kedah	214,585	4,377	939,308
Kelantan	74,531	4,154	309,582
Malacca	3,510	3,457	12,135
Negeri Sembilan	2,040	5,030	10,261
Pahang	13,006	2,186	28,434
Perak	81,284	3,613	293,715
Perlis	51,531	4,489	231,328
Penang	25,564	5,737	146,660
Sabah	29,955	2,952	88,424
Sarawak	67,442	2,986	201,413
Selangor	36,708	4,510	165,571
Terengganu	16,919	4,002	67,745
Malaysia	620,075	4,037	2,503,109

Source: Department of Agriculture, Penang.

The rice industry in Penang is facing serious challenges. The conversion of paddy fields to non-agricultural or non-paddy agricultural purpose is a major threat to the rice industry as well as to food security, especially in Seberang Perai, which has undergone significant urbanisation over the past decade. Furthermore, the lack of acceptance of modern farming practices (particularly among farmers above 60 years old) and rice-processing equipment has resulted in slower production growth. Irrigation is another challenge; Penang draws most of its raw water for domestic use, industrial use, and irrigation of paddy fields from Sungai Muda in Kedah. Being so dependent on one source, particularly with increasing water demand in both Penang and Kedah, is risky, especially during water crises. This indicates the need to find alternative sources of water and to apply new approaches in water management.

The fruit industry

Among the economically important fruits that Penang produces are durians and pineapples, planted mainly in Barat Daya and Seberang Perai Selatan districts, respectively. However, land used for fruit cultivation in Penang has been steadily decreasing. The planted area of fruits in Penang has seen a 48.8% decline between 2009 and 2018 (Figure 3.69). This is mostly due to the increase in land allocation for residential and development purposes and competition from other sectors. Nonetheless, Penang's output has been steadily increasing since 2009, suggesting that there has been an increase in average yield per hectare. If this rise in productivity is coupled with an increased land allocation to the industry, the problem of self-sufficiency can be manageable.

The global PCC of tropical fruits has been growing steadily over the past decade (FAO, 2020); therefore, there is potential growth in export opportunities. Good agricultural practices and quality standards must be met in order to export tropical fruits. Integrated marketing that covers appropriate pricing, labelling, packaging, and branding (e.g., fresh, nutritious, high quality, and exotic) can help capture the growing global market.

**Figure 3.69 Fruits production and planted area in Penang, 2009−18**
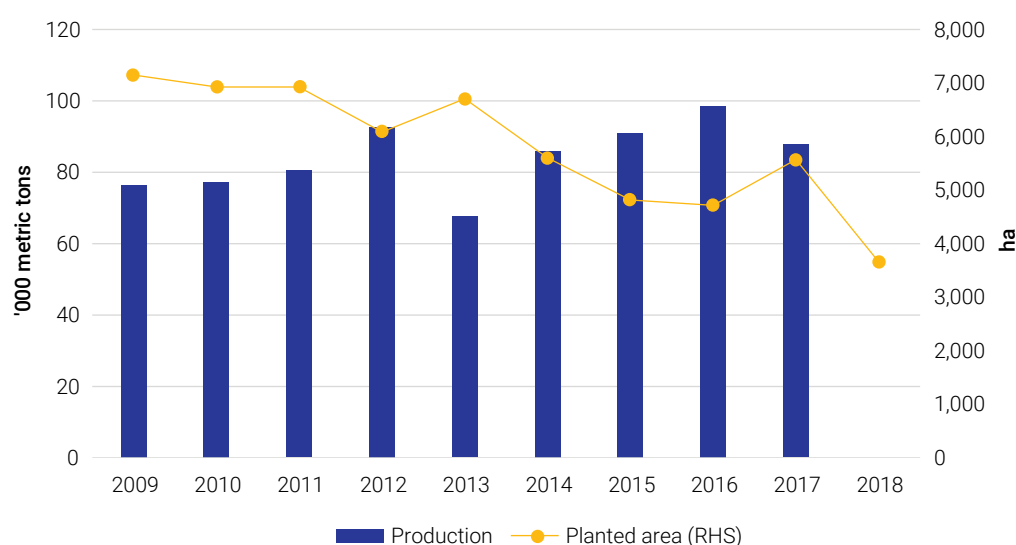
Note: Data on fruits production for 2018 is not available.
Source: Department of Agriculture, Penang.

The vegetable industry

In Penang, the planted area of vegetables has seen an average annual growth rate of about 6.1% between 2009 and 2018. Along with the growing planted area, vegetable production in Penang is also facing an upward trend at the same pace (Figure 3.70). The 57.2% increase in output from 2009 to 2017 indicates that Penang's vegetable sub-sector is expanding. Despite the robust growth, production is still below domestic demand. Most vegetables pass through middlemen—collectors, transporters, and/or wholesalers. A small number of farmers supply produce directly to markets or to the Federal Agricultural Marketing Authority (FAMA). This structural friction could affect the price of vegetables. Health awareness and the rise of the vegan/vegetarian culture are expected to drive demand for vegetables.

Figure 3.70 Vegetable production and planted area in Penang, 2009−18
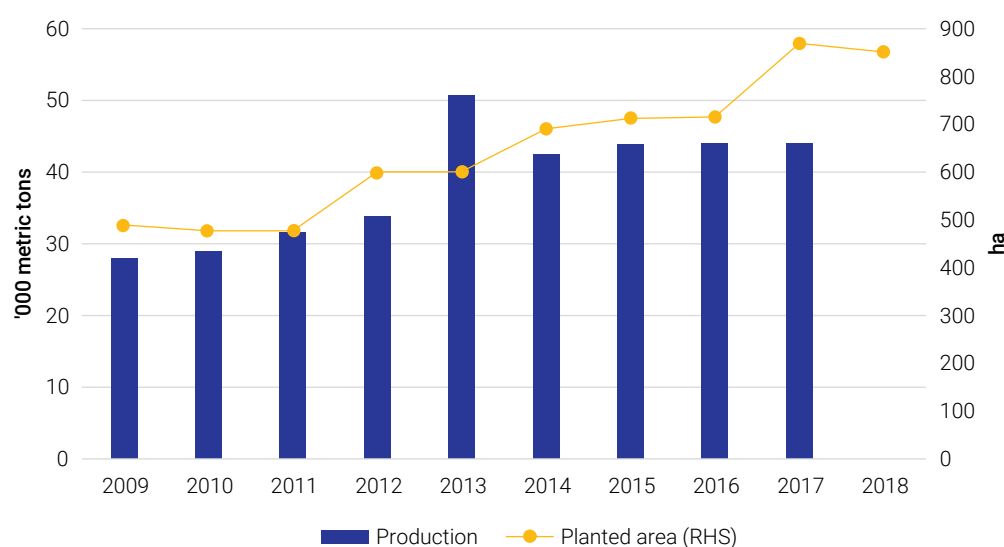
Note: Data on vegetable production for 2018 is not available.
Source: Department of Agriculture, Penang.

Although vegetables occupy a relatively small share of the market, organic production represents one of the fastest-growing segments of the Penang vegetable sub-sector. Organic farming is a niche export market opportunity that can bring high revenues to the country, especially for fruits and vegetables. One of the strategies undertaken by the government is to encourage small-scale farmers to participate in organic farming to increase their income. In addition, organic agriculture avoids problems of chemical residue, minimises environmental pollution, and reduces food imports while having export potential.

3.4.2 Livestock sub-sector

The livestock sub-sector is an integral component of the agricultural sector in Malaysia, since it provides gainful employment and is the largest source of protein for Malaysians. In 2018, the Malaysian livestock industry accounted for 14.9% of the of the agriculture sector's contribution to the GDP, 3.5 percentage points greater than the previous year.

Penang's livestock sub-sector has grown gradually over the years. This sub-sector is divided into two main categories: ruminants including cattle, sheep, goat, and buffalo, and non-ruminants encompassing chicken, duck, pig, and egg. While the non-ruminant sub-sectors, especially poultry and pig, have grown over the years, the ruminants sub-sector has not. The non-ruminants sub-sector is marked by well-developed technology and the involvement of the private sector, in contrast to the ruminant sub-sector.

In 2018, the number of livestock farmers dropped by 27.3% compared with 2015. Yet the total number of livestock increased by 1.7% in the same period, mainly the result of the increase in the number of sheep and pigs (Table 3.44).

Table 3.44 Number of livestock farmers and livestock population in Penang, 2014–18

Commodity	2015		2016		2017		2018	
	Livestock farmers	Livestock population	Livestock farmers	Livestock population	Livestock farmers	Livestock population	Livestock farmers	Livestock population
Cow	803	14,766	485	11,689	470	11,642	502	17,633
Buffalo	43	601	44	592	39	574	35	622
Goat	372	8,854	345	8,779	368	10,215	333	8,686
Sheep	66	1,880	64	1,628	55	2,757	52	2,634
Pig	189	294,429	183	285,755	174	317,897	167	357,243
Chicken	386	12,475,540	334	12,539,480	324	10,739,513	281	12,802,065
Duck	52	485,058	38	460,510	30	235,033	20	318, 200
Total	**1,911**	**13,281,128**	**1,493**	**13,308,433**	**1,460**	**11,317,631**	**1,390**	**13,507,083**

Source: Department of Veterinary Services, Penang.

Poultry and pig farming make up approximately 82% of the total livestock production in Penang. The production of poultry meat and pork in Penang has exceeded local demand; in 2019, the SSL of poultry meat and pork were recorded at about 141% and 265%, respectively. However, the production of eggs, fresh milk, cow/buffalo meat, and goat/sheep meat were insufficient to meet local demand (Figure 3.71).

Figure 3.71 Self-sufficiency level of livestock products in Penang, 2019
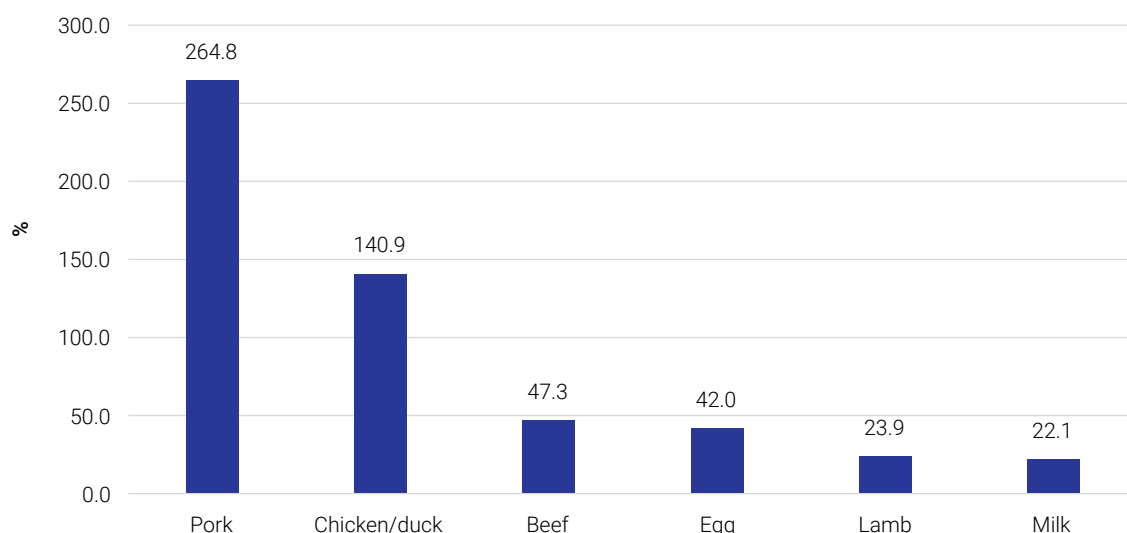
Source: Department of Veterinary Services, Penang.

Over the past decade, the production and wholesale value of pork increased by 118.4% and 9.2%, respectively (Figure 3.72). However, in 2019, the production and value of pork dropped by 5.2% and 4%, respectively, compared with 2018. The pork industry is the most self-sufficient livestock commodity in Penang. By 2025, pork meat output is expected to reach 37,900 metric tons while demand will grow to 14,900 metric tons.

Figure 3.72 Production and wholesale value of pork in Penang, 2010–19
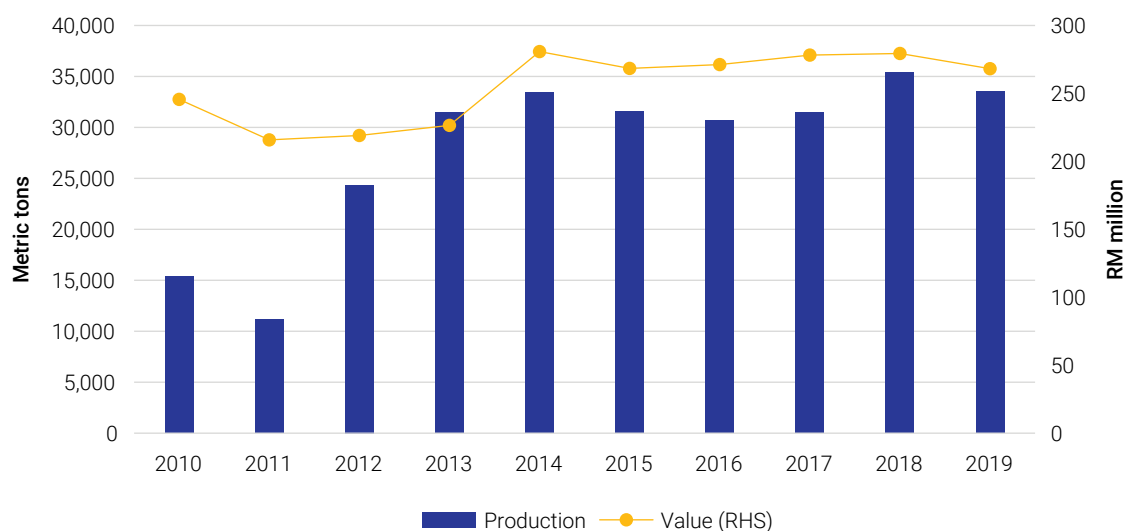
Source: Department of Veterinary Services, Penang.

The growth of poultry meat production has been steady between 2012 and 2018, with minor fluctuations. In 2019, chicken/duck production and wholesale value in Penang increased by 16.9% and 33.6%, respectively, compared with 2018 (Figure 3.73). The poultry sub-sector has grown significantly over the last few decades into a complex commercial industry. An integrated production system has been vital in the last two decades. Although duck meat production is significantly lower, it is still sustainable due to lower demand.

Figure 3.73 Production and value of chicken/duck in Penang, 2010–19
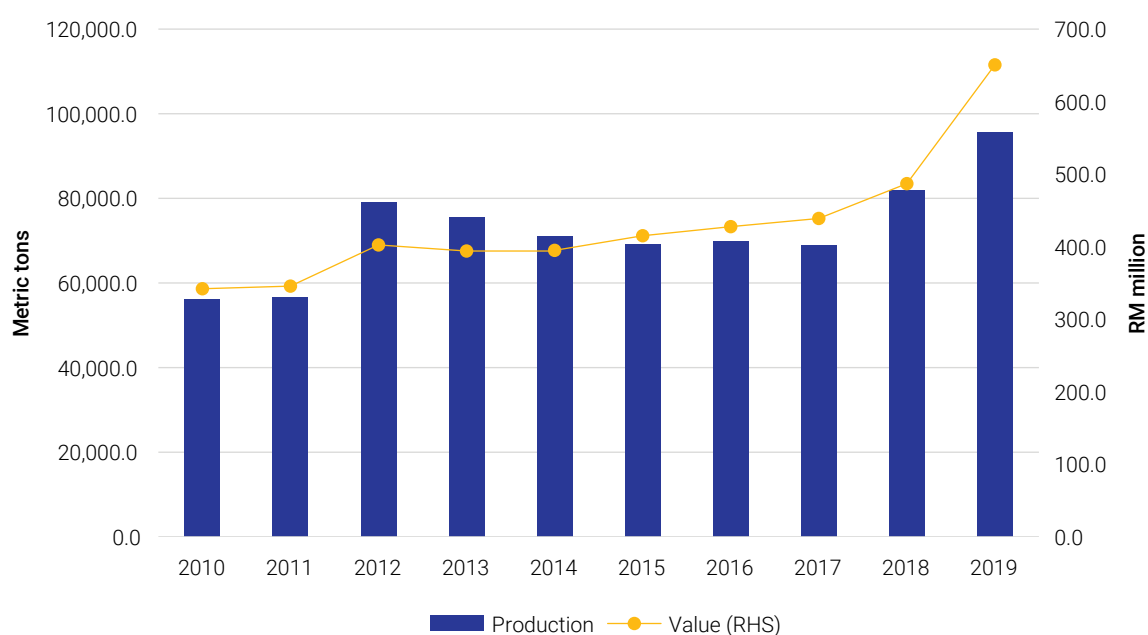
Source: Department of Veterinary Services, Penang.

The growth of both pork and poultry sub-sectors has required an increase in feed import since domestic feed production is insufficient. Meanwhile, major players in the poultry sub-sector are converting conventional breeding systems to closed house systems. This is because the closed house system offers better disease control (hence a decreased mortality rate) and better output quality.

Although the Malaysian egg industry has been self-sufficient since 1982, Penang has been struggling to satisfy domestic demand. As presented in Figure 3.74, the production and wholesale value of eggs has dropped significantly by 55.2% and 55.4% between 2010 and 2019. The increased cost of production is the main factor, fuelled by the rising price of chicken feed. Naturally, the SSL of the egg industry has decreased; in 2019, its SSL dropped to 42% from 117.2% in 2010. By 2025, Penang's production is expected to reach 281.5 million eggs compared with a demand of 491.4 million eggs.

Figure 3.74 Production and value of egg (chicken/duck) in Penang, 2010−19
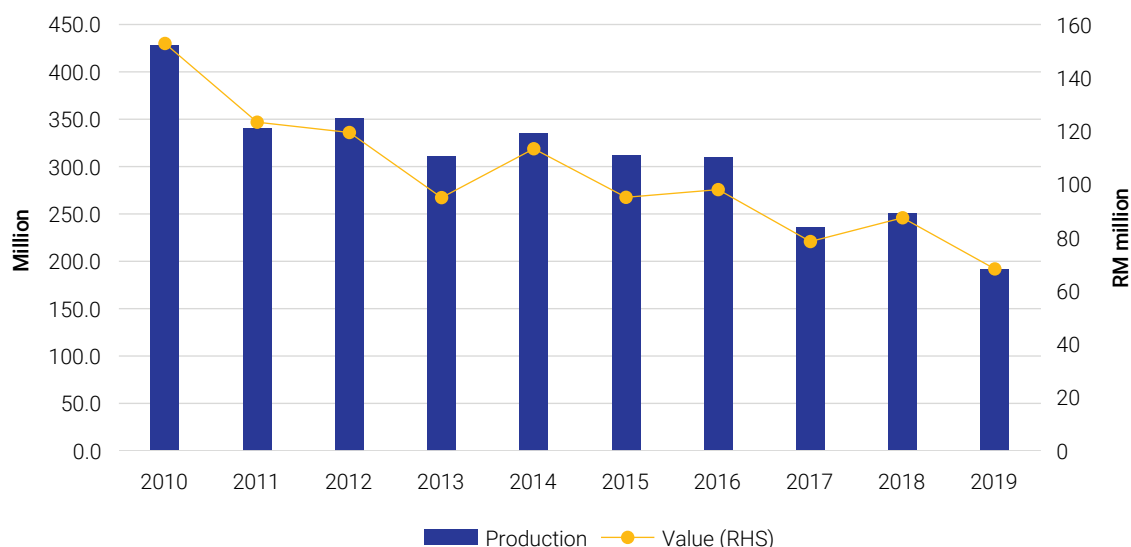
Source: Department of Veterinary Services, Penang.

Beef is produced from beef cattle, culled dairy cattle, and buffaloes. Production in Penang has risen by 493.2% from 2010 to 2019, growing from 927 to 5,499.2 metric tons. Its value has also increased by nearly 305% (Figure 3.75). In 2018, the production and value of beef increased by about 98.3% and 98.4%, respectively, compared with 2017, mainly owing to a significant increase (51.5%) in cow population. Despite this, the increase in demand for beef has outstripped production. By 2025, demand for cow/buffalo meat is expected to increase by 3% per year, while production is expected to increase by only 2%.

Figure 3.75 Production and value of beef/buffalo in Penang, 2010−19
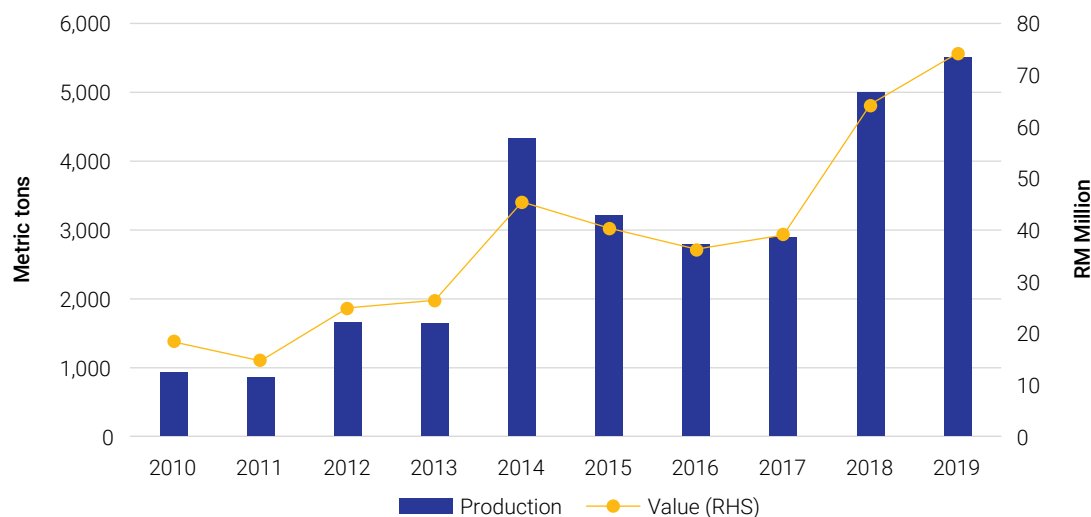
Source: Department of Veterinary Services, Penang.

The sheep/goat industry in Penang is still in its infancy. The industry has experienced an extensive growth in production, from 21.7 metric tons in 2010 to 427.2 metric tons in 2019 (Figure 3.76). However, total production is still well below the projected demand of 1,700 metric tons. Given that the state government expects an average annual growth rate of 2% from 2019 to 2025, drastic measures need to be taken to revamp this industry.

Figure 3.76 Production and value of goat/sheep in Penang, 2010−19
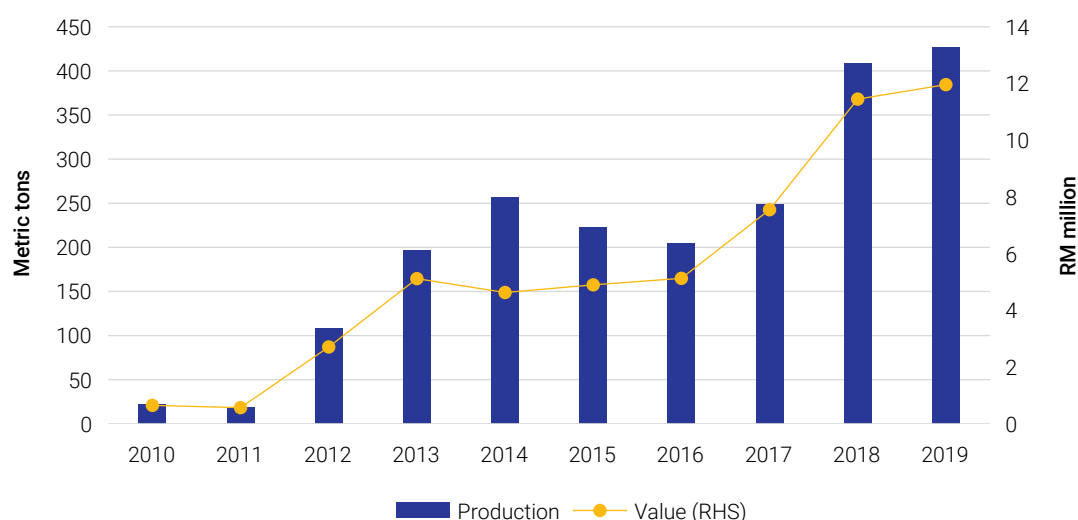
Source: Department of Veterinary Services, Penang.

Between 2010 and 2019, the production and value of fresh milk increased by 82.2% and 1,199.2%, respectively (Figure 3.77). In 2019, the SSL of the fresh milk industry was only 22.1%. In 2025, projected fresh milk output (0.6 million litres) is still expected to trail behind demand for fresh milk (64.8 million litres). Improved awareness over the nutritional benefits of fresh milk among consumers, coupled with the growing preference for dairy-derived products, has fuelled the rise in demand.

Figure 3.77 Production and value of fresh milk in Penang, 2010−19
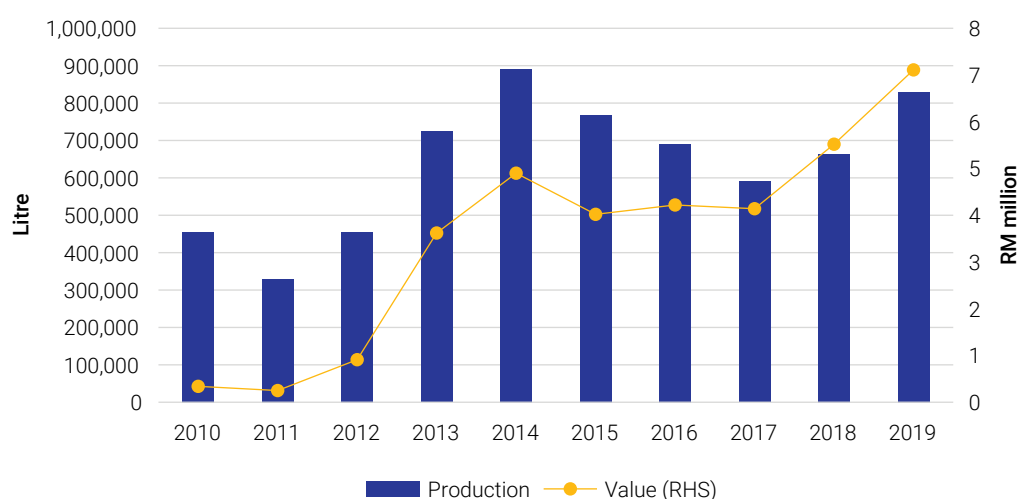
Source: Department of Veterinary Services, Penang.

Overall, rapid economic and population growth in Malaysia and Penang has led to an increase in demand for livestock products over the last decade. However, the sector is facing serious challenges such as lack of land and labour, high feed costs, and lack of private sector involvement.

3.4.3 Fisheries sub-sector

Despite accounting for less than 1% of the national GDP and only 12.5% of the agriculture sector (Department of Statistics Malaysia, 2019c), the fisheries sub-sector provides employment for thousands of people, especially in rural communities. It also tackles poverty among coastal communities and contributes about 44% of the total animal-sourced protein intake, particularly of the poorer classes. The sub-sector therefore contributes to food and nutrition security, employment, and national economic growth.

Production from marine capture fisheries on the west coast of Peninsular Malaysia are expected to become unreliable because many fish stocks have been overexploited. Therefore, various aquaculture techniques are being explored to increase production.

In 2018, Penang's food fish sub-sector (consisting of marine-capture fisheries, aquaculture fisheries, and inland fisheries) produced 83,917.7 metric tons valued at RM1.1 billion, but domestic demand for fish still outweighed supply. In 2018, the wholesale value of food fish production in Penang was the second-highest in the country (behind Perak), with marine-capture fisheries contributing about 65% to the state's food fish production (54,854 metric tons valued at RM522.6million), while aquaculture contributed nearly 35% (29,027.1 metric tons valued at RM551.2million) and production from inland fisheries contributed less than 0.04% of the total.

Marine-capture fisheries

Despite a significant decline in marine-capture fisheries from 1995 to 2005, the quantity of marine fish landings peaked at 63,972 metric tons in 2011. In 2018, the production of marine-capture fisheries increased by about 7.2% over 2017, yet its wholesale value dropped by 5.6% (Figure 3.78). The decline in value may be due to smaller catches of high-value fish and larger catches of lower-priced fish. In 2018, the largest contribution to total landings in Penang was from trawl nets (41.1%), followed by drift/gill nets (35.5%) (Figure 3.79). However, these methods are not sustainable. Trawls, which are cone-shaped nets, scrape the seabed and catch not just adult fish, but also juveniles, while destroying their breeding or spawning grounds. More sustainable fishing practices are needed.

Figure 3.78 Marine landing fish production and value in Penang, 1995–2018
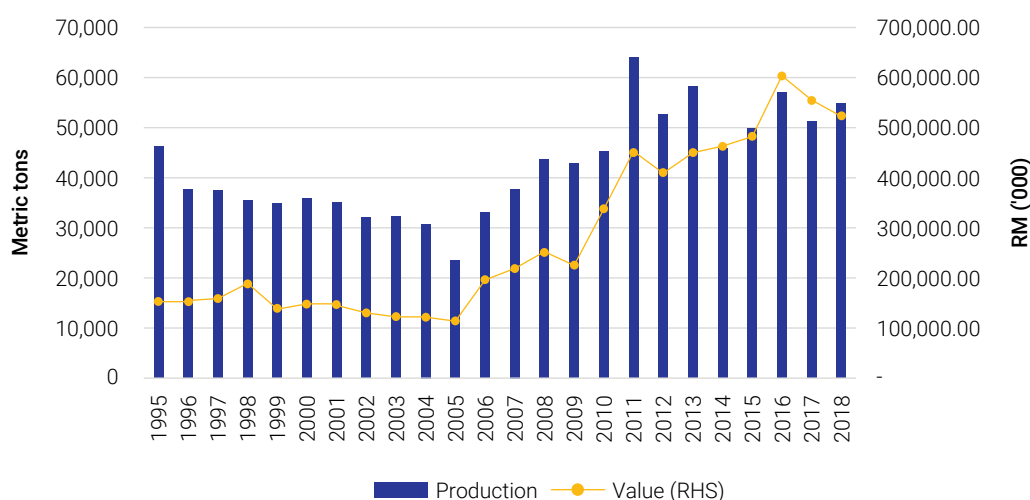
Source: Department of Fisheries, Malaysia.

Figure 3.79 Percentage catch by fishing method, Penang, 2018
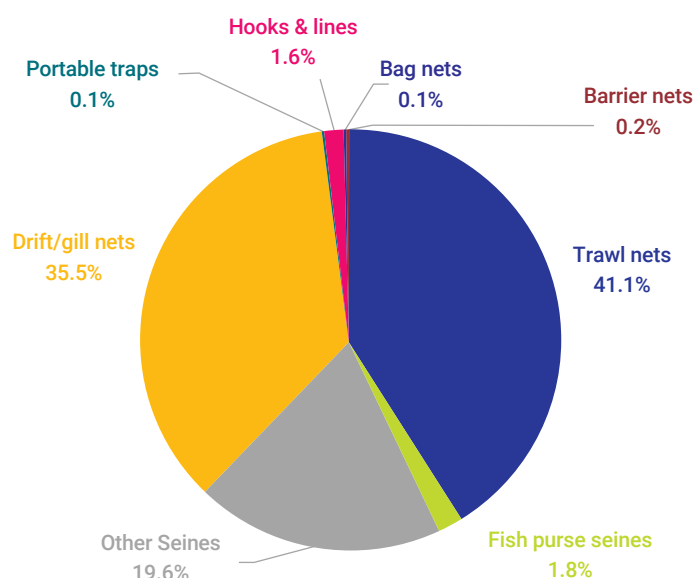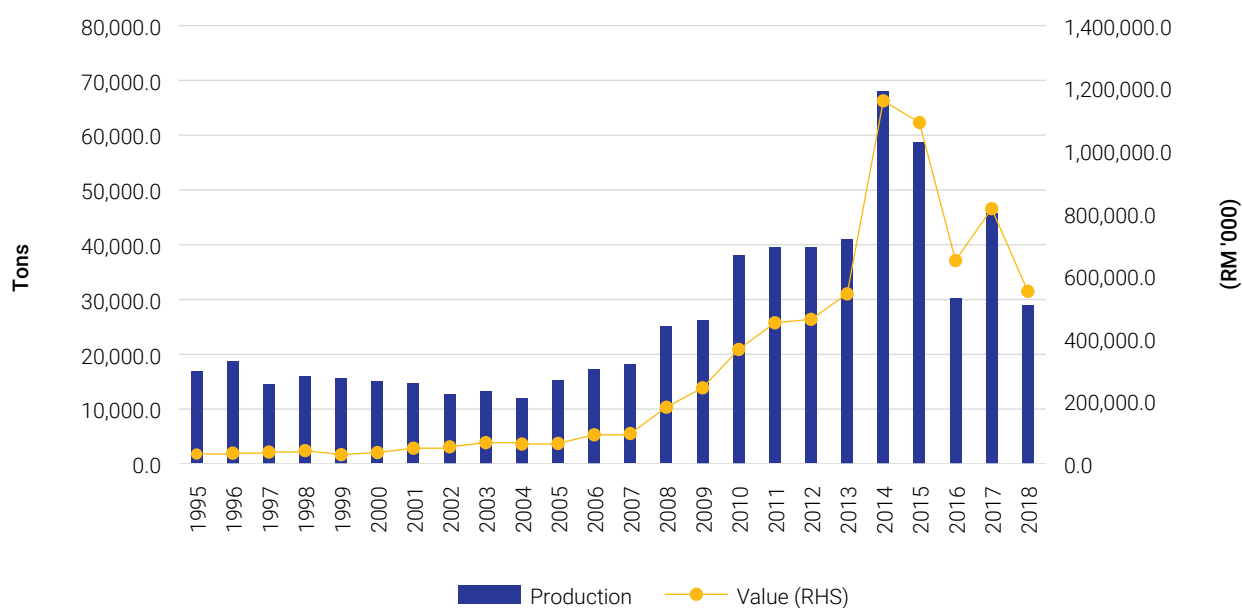

Source: Department of Fisheries, Malaysia.

Aquaculture sector

Aquaculture is becoming a more economically viable method of increasing local fish production in anticipation of increased demand. In Malaysia, high-grade aquaculture products are mostly exported, while catches from marine landings are sold domestically.

From 1995 to 2018, Penang's aquaculture sector grew at an average annual growth rate of 5.7% and 18% in production and value, respectively (Figure 3.80). Yet the state's aquaculture production and value dropped by 36.5% and 32.4%, respectively in 2018 compared with 2017. This decline was mainly due to the November 2017 floods which

significantly damaged aquaculture cages. Penang's aquaculture recorded the fourth-highest production in the country after Sabah, Perak, and Johor. However, its production gained the second-highest wholesale value behind Perak.

Brackishwater ponds and cages constitute the majority of Penang's aquaculture. In 2018, fisheries from brackishwater culture systems accounted for 31.7% of Penang's total fish production and nearly 50.4% of its wholesale value. Of these, sea bass and snapper recorded the highest production, followed by shrimp, cockle, and other brackishwater cages species, such as grouper and mackerel.

Figure 3.80 Aquaculture production and value in Penang, 1995−2018

From 2011 to 2015, Penang's farmed shrimp has had the highest wholesale value in the country, and Penang was the second-largest producer of shrimp after Sabah. In 2016, its shrimp production dropped by 58.7% compared over 2015, mostly owing to disease (Figure 3.81). However, its wholesale value was the second-highest nationwide. Production and wholesale value of shrimp declined by 51.8% and 52.6%, respectively, in 2018 over 2016, possibly because of ongoing disease issues and the November 2017 floods.

Figure 3.81 Shrimp production and value in Penang, 2011−18
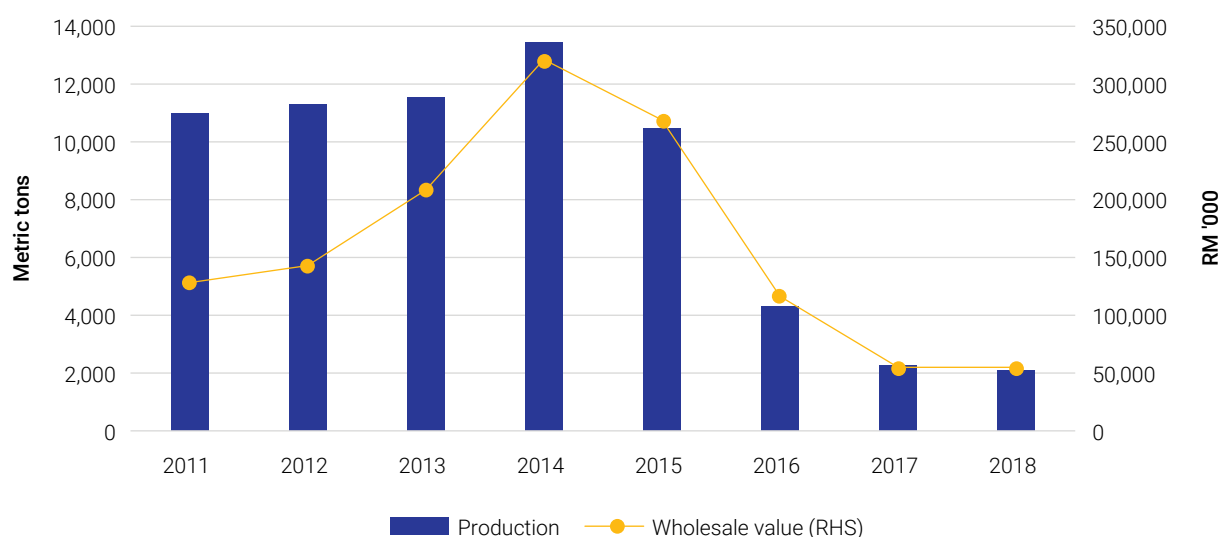
Meanwhile, Penang's natural mangrove mudflats are suitable breeding areas for cockles. Penang is the third-largest cockle producer in the country, behind Perak and Selangor. In 2018, its wholesale value was the second-highest in the country after Perak. Cockle production in Penang dropped sharply from 7,330.8 metric tons in 2014 to 1,844.2 metric tons in 2018, mainly because of poor water quality, disease, and fluctuations in water temperature. The decreased supply and high demand increased the price of cockles in major markets in Penang.

Box 3.7 Agricultural transformation to achieve SDGs

By Negin Vaghefi

The agriculture sector plays a strategic role in the country's economic structural transformation. The sector contributes to economic development through providing food and employment—especially for the poor—while supplying raw material to non-agricultural sectors of the economy and contributing to exports.

Although major improvements in agricultural productivity have been recorded over the past several decades, progress has often come with societal and environmental costs, including water scarcity, soil degradation, ecosystem stress, biodiversity loss, decreasing fish stocks and forest cover, and high levels of greenhouse gas emissions. In addition, the sector is facing many challenges such as land and labour scarcity, high production costs, disease, and climate change. Overcoming these challenges requires transformative action and embracing the principles of sustainability. By adopting sustainable agriculture, we will be able to feed a growing population.

The agriculture sector can help achieve multiple Sustainable Development Goals (SDGs). The sector is important in achieving SDG1 (no poverty), SDG2 (zero hunger), SDG3 (good health and wellbeing), SDG4 (quality education), SDG5 (gender equality), SDG8 (decent work and economic growth), SDG10 (reduced inequalities), SDG14 (life below water), and SDG15 (life on land).

Sustainable agriculture needs to be mainstreamed into national development strategies and action plans. A transition to more sustainable agriculture should balance the economic, social, and environmental dimensions of sustainability. Besides increasing productivity, employment, and value-added in the food system, sustainable agriculture should also protect natural resources, enhance livelihoods, and increase inclusive economic growth. Because of its multi-dimensional nature, multi-stakeholder mechanisms are required to pool together resources and expertise.

Moreover, a public-private partnership (PPP) model for sustainable agricultural development needs to be developed. A successful PPP should clearly identify roles and responsibilities according to the unique skills and expertise that each partner can provide, with appropriate incentives designed to maximise their strengths. Unlocking the potential of the private sector is essential. More than just a source of financing, private sector partnership would bring technology development, knowledge transfers, and innovation, as well as creates jobs and alternative revenue streams.

Establishing SDG implementation platforms in the agriculture sector to develop more integrated programmes and policies, better interlink various goals, monitor progress, and identify and address barriers to change will be important to enable real transformation to sustainable agriculture.

Box 3.8 Impact of COVID-19 on the agriculture sector[56]

By Negin Vaghefi

The COVID-19 pandemic has posed challenges to all economic sectors, particularly agriculture. The lockdown to contain COVID-19 has affected food security and the food supply chain directly through impacts on food supply and demand, as well as reduced agricultural labour, and indirectly through changing consumer behaviour. During the Movement Control Order (MCO), road closures and transport restrictions slowed down agricultural services and prevented farmers, particularly smallholders, from selling their products or buying inputs, leading to wasted produce and loss of income.

According to the Department of Agriculture (DOA) Penang, various issues occurred in the crop sub-sector during the MCO, including the limited availability of fertilizers, pesticides, seeds, machinery spare parts, and farm equipment. In addition, farmers have had trouble marketing their products. Perishable and fresh produce such as vegetables were more affected, resulting in increased levels of post-harvest lost (PHL) and food waste. During the first phase of the MCO, vegetable and fruit production in Penang dropped at an average daily rate of 3% and 1.3%, respectively.

Although the supply of livestock products was sufficient during the lockdown, some sub-sectors were negatively impacted by the COVID-19 crisis. During the first phase of the MCO, some small-scale farmers and distributors had difficulties selling their products due to a lack of market access and logistical constraints. According to the Department of Veterinary Services (DVS) Penang, around 49 small-scale dairy farmers could not sell their milk products daily, which resulted in a total estimated loss of RM7,000 per day. A cost of RM4,320 and RM7,394 per day were borne by traditional poultry and large ruminant farmers, respectively. Furthermore, since 1 April, the price of livestock feed, especially cattle feed, has increased by about 3–6%, mostly because of the rising prices of molasses and palm kernel expeller (PKE) by 22% and 32–36%, respectively. This has had an impact on total production costs. The total loss of the livestock sector has been estimated at RM18,713.68 per day (RM261,991.52 per day during the first two weeks of MCO).

The fish supply chain in Penang was also adversely affected by the pandemic. According to the Department of Fisheries (DOF) Penang, during the first phase of the MCO, some fishermen and culturists faced difficulties in selling their products as the market demand for fresh fish and aquatic products saw a sudden decline, coupled with limited sales operations as a result of the closure of, or the limited opening hours, of morning and night markets. Many wholesalers also stopped buying fish and aquatic products because restaurants were ordered to remain shut except for takeaways. Many fishermen were therefore reluctant to go out to the sea. As a result, captured fish declined by about 70–90% in March 2020 compared with February 2020. Aquaculture production also dropped by nearly 80% in March 2020 compared with the previous month, mostly because of limited access to inputs such as seed and fish food, labour shortages, and limited operations of seafood restaurants and hotels. The decline in captured fishery and aquaculture products is expected to push the price of fish and aquatic foods up, which in turn would have a notable impact on the fishing industry and communities.

The COVID-19 pandemic has renewed a sense of urgency for the general use of automation. In fact, agriculture 4.0 and the digitisation of the supply chain is the way forward in assisting farmers in enhancing productivity as well as adopting labour- and input-saving practices. Technologies that link farmers to buyers and logistics services can help minimise the impact of a pandemic on the supply chain. Empowering e-commerce in agribusiness also facilitates trade, reduces transportation risks, and allows access to the market.

[56] Adapted from Vaghefi (2020).